EXCEL 2022

COMPLETE GUIDE

The Concise Step-by-Step Practical Guide to Master Everything About Excel 2022 in 7 Days or Less (Excel Basics, Formulas, Functions, Pivot Tables, Dashboards, Power Query, & Data Analysis)

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CARTY BINN

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EXCEL FOR BEGINNERS

CHAPTER ONE

INTRODUCING EXCEL

Microsoft Excel 2022 is a spreadsheet app and the latest Excel software that allows individuals to arrange, manage, and add data while utilizing formulae. Additionally, the software is included in the Microsoft Office suite, but it is also linked with more office applications.

As the majority of other Microsoft apps are, Excel can be assessed as a cloud-based subscription via Office 365. With Excel, you can perform more functions than you think, as an individual or organization.

The software was specifically made for Mac OS and Windows users. Both users are capable of carrying out functions including creating pivot tables, using graph tools, and forming easy arithmetic. Furthermore, Excel enables us to use the AVERAGE and other functions that will guarantee success in our workplace.

Workers looking to arrange and organize data can use a set of cells formed into columns and rows to do so, and this can be made possible by using Microsoft Excel 2022. Excel also uses histograms, charts, and line graphs to display data.

UNDERSTANDING WHAT EXCEL IS USED FOR

Excel is a popularly used Microsoft Office application that companies and individuals usually use to analyze and save numerical data. Furthermore, it is a spreadsheet program where individuals and companies can record data to create tables. With an MS Excel spreadsheet, it is simple to analyze data. You can summarize data and save it in an orderly manner with the aid of graphs and charts so that you can readily access it whenever you need it. It becomes easy to save data, and you will save a lot of time as a result.

MS Excel also lets users arrange, format, and calculate data while using formulas with a spreadsheet system. There are numerous formulae in MS Excel. By utilizing them, you perform many operations on a huge quantity of data at once, such as computing the sum, average, and so on. As a result, MS Excel is used anytime users need to solve difficult mathematical issues or apply basic mathematical functions to tables with a lot of data.

MS Excel has a plethora of functions that make your job a lot easier and save you time. There are fantastic tools for sorting, filtering, and searching that make your job even easier. You can do your task in much less time if you combine these tools with tables, pivot tables, and other tools ***(NB: Multiple components may be readily found in vast volumes of data to assist in the resolution of a variety of issues and concerns)***.

Excel allows you to add more complexity to your data. ***(NB: This means you can enhance the data bars, highlight any particular elements for laying emphasis, and quickly make your data more attractive)***. If you have data saved in MS Excel and you want to emphasize something significant, you may do it using the numerous data presentation options provided in MS Excel. You can even make the spreadsheets on which you've placed data more appealing.

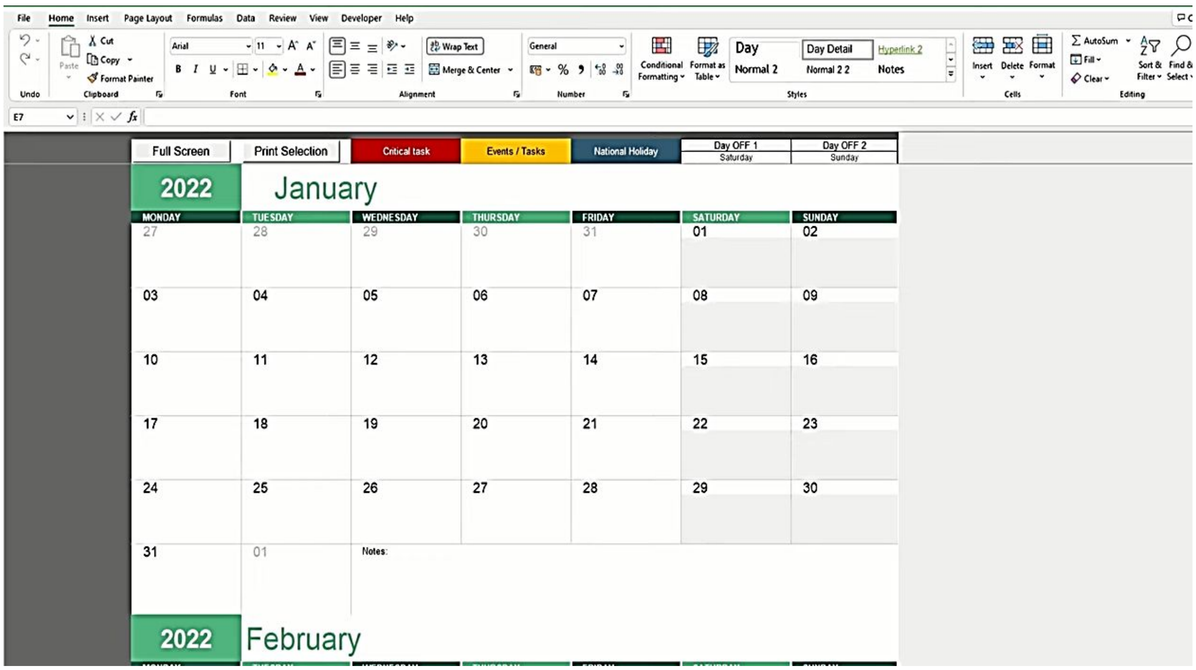
MS Excel is useful for budgeting. For example, if a doctor earns $50,000 per month, he will incur some expenses, and if he wants to know exactly how much he is spending each month, he can easily do so using MS Excel. He can enter his monthly income and expenses into excel tables, which will allow him to see how much he is spending and, as a result, control his spending.

Excel is among Microsoft Office suite, and it is compatible with additional applications in the Microsoft Office suite. Like other Microsoft Office products, users can purchase Microsoft Excel 2022 and previous models through the cloud on a subscription basis via Office 365. In addition, this software program uses a cell collection organized into columns and rows to organize and separate data. It is capable of displaying data as charts, line graphs, and histograms.

There are numerous advantages to using MS Excel, which is why it is used by people worldwide for a variety of tasks. Not only does it save time, but it also makes the job easier. It is almost capable of completing any task. For example, you can perform mathematical calculations as well as create graphs and charts to store data. It is simple for a businessperson to compute and save data in it.

LOOKING AT WHAT'S NEW IN EXCEL 2022

Excel 2022 comes in with its new calendar template. Nobody wants to start this year off with a ton of spreadsheets if we are being totally honest. Luckily, this template only has one sheet and it's the only sheet you need.



In the smart calendar sheet, you have a calendar. A cool feature of this template is that when you hover over the interactable aspects of the template, a guide pops out with information on how the tools are used.

This template is flexible because you can adjust out the year to your liking whether you want to skip ahead to 2023 or relieve the good old days of 2019. The template adjusts the dates for you automatically. In the first day label, you can decide what day you want to start your weeks with.

If you want to mark an entry as critical, you need to put an asterisk in front of it so the data shows red. For normal events, you just input values normally and for holidays, you input a forward slash. You get the whole set from January to December and on the top left, you have a full-screen macro button that hides the ribbon for a larger work area and a print selection button that allows you to print the areas you have highlighted.

As always, in the intro sheet, you get the standard items like the content, customization difficulty, explanation of the sheets, and instructions on how to utilize this template.

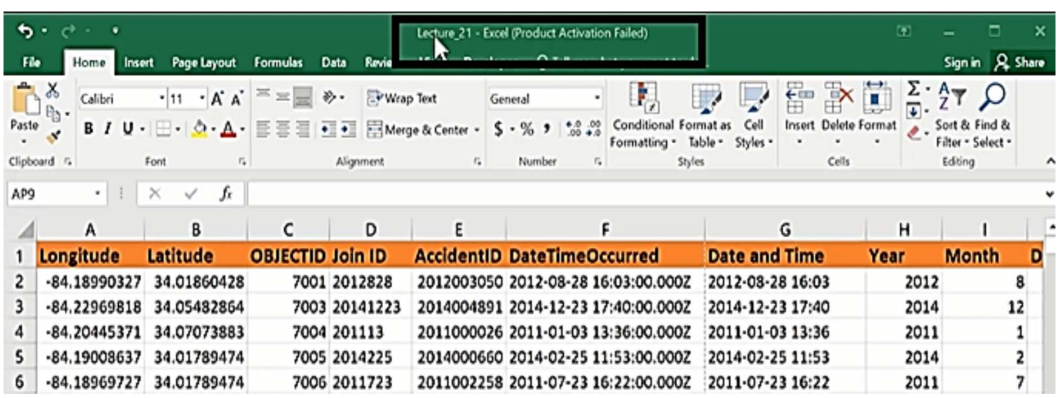
UNDERSTANDING WORKBOOKS AND WORKSHEETS

The electronic counterpart of a paper ledger is a worksheet. It's a powerful toolset for entering, analyzing, calculating, and manipulating data. A worksheet may be used for simple calculations like addition and subtraction, as well as more complex applications like statistics, audits, and mortgage tables. Worksheets also make it simple to turn your data into useful business reports.

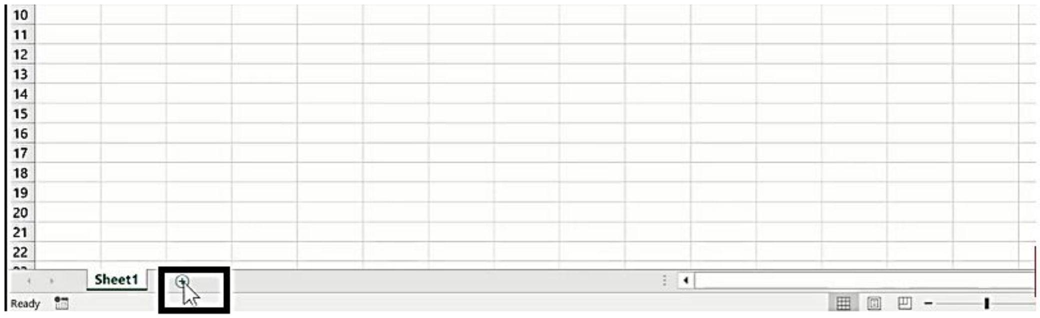
A workbook is a file that contains a collection of worksheets. These worksheets may include a variety of data, but they are generally connected in some way. Each worksheet in a sales workbook, for instance, may include sales data for a single division.

Workbooks may have an infinite number of worksheets, depending on the size of the worksheet and the amount of memory available on your computer. A workbook may also contain chart sheets, Visual Basic modules, dialog box sheets, macro modules, and scenario report sheets in addition to worksheets.

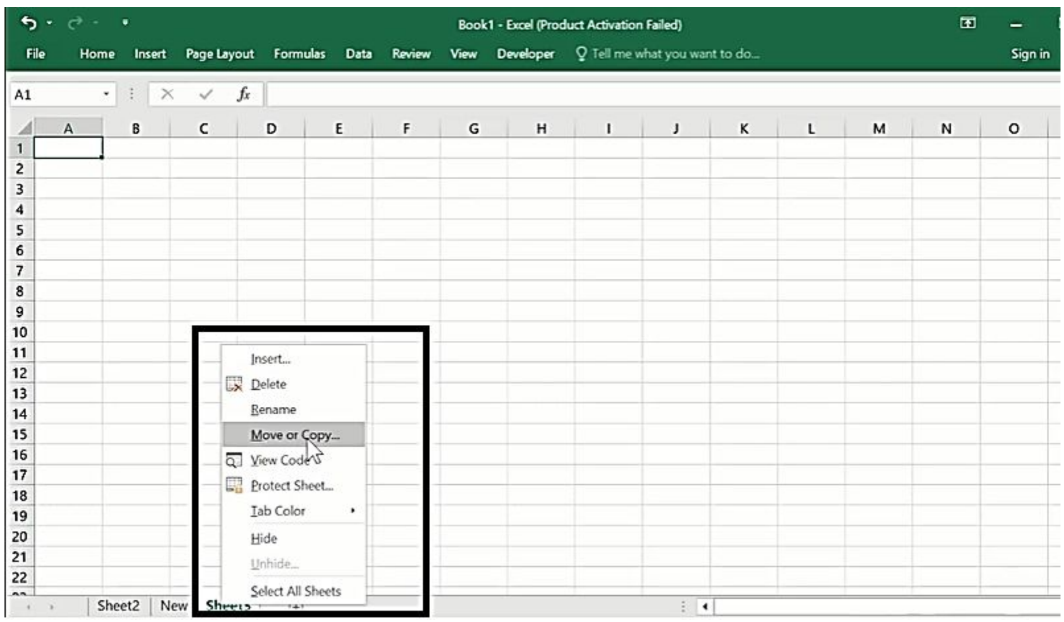
In Excel, a workbook is the same as a file, and a file is the same as a workbook. At the top of the screen, we can see the file or workbook's name.



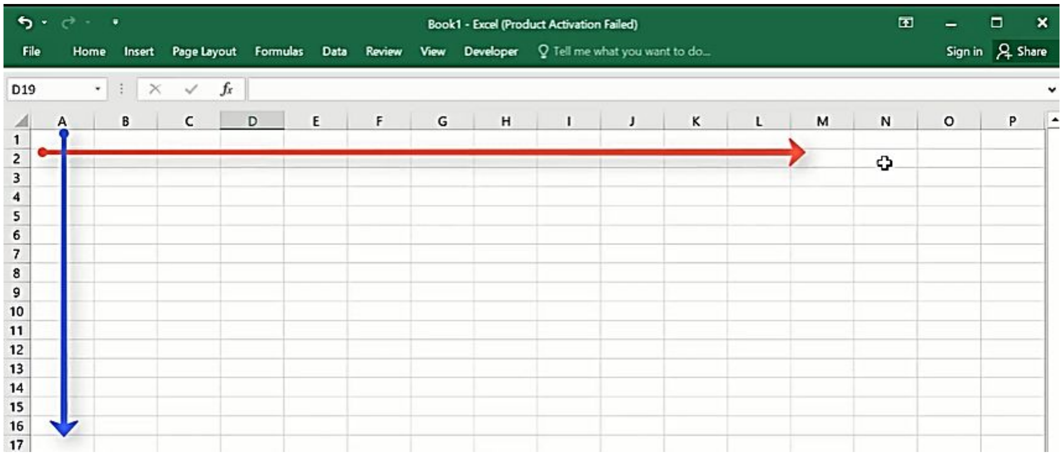
If it's a new file, it'll be called **Book 1**. To open a new workbook, go to **File** > **New** > **Blank Workbook**. At least one worksheet is included in every workbook. You can add more sheets if necessary by clicking on the Add Sign (+) below the window.



We can remove sheets. We can relocate them. We can copy them. Columns and rows make up every spreadsheet or simply sheet. You can get all the options by right-clicking on the worksheet you want to act on.



Vertical columns are indicated by letters. The rows are laid down horizontally. Numbers are used in identifying them.



There are about 16,384 columns and 1,048,576 rows at the bottom. There is an address in every cell in an Excel spreadsheet. To summarize, a workbook is a file, and a workbook is a file. We have a working sheet with over a million rows and over 16,000 columns on each.

MOVING AROUND A WORKSHEETS

When you open a new workbook in Excel, the worksheet's "**active cell**" is positioned in the top-left corner (**in Cell A1**). You must move about in your worksheet to build it or make changes to it. You can move around your worksheets in Excel in two ways; by using the Keyboard or the Mouse.

Navigating with your keyboard

By hitting the arrow keys and other direction keys on the keyboard, you may navigate around the worksheet. When you move around in the worksheet using the keyboard, the active cell moves with you. The contents of the active cell are then added or edited. Below are the shortcuts you can use;

Up arrow key	Move up the next row (one row)
Left arrow key	Move to the next cell on the left
Right arrow key	Move to the next cell on the right
Down arrow key	Move down the next row (one row)
Control key + End	Moves to The cell that is located at the junction of the column on the right and the bottom-most utilized row.

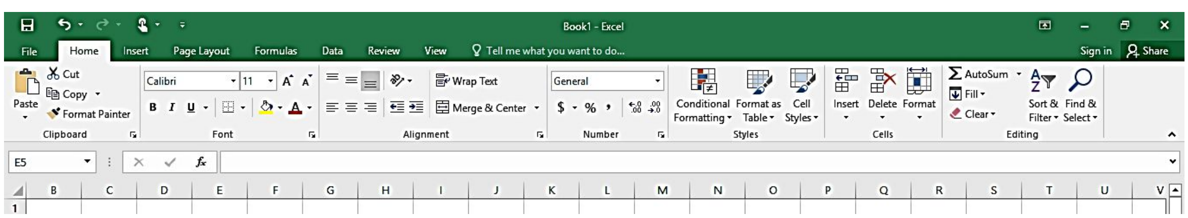
Control key + arrow key	Moves to the last row or column in the worksheet
Page Up	Moves up one screen page
Page Down	Moves down one screen page
Control Key + Home	Moves to Cell A1

Navigating with your Mouse

Using the wheel on your mouse, you can move around on your worksheet. You can use it to scroll up and down to navigate through the worksheet. You can add more sheets using the mouse by clicking on the add sign below the screen. By clicking on a worksheet tab, it displays the sheet for you to work on/with it.

To navigate quickly to a cell, check the left-hand side of the formula bar and click on the Name box. Type in the cell address i.e. the column letter & the row number. For example, type in **A6**, or **B2**, then press **Enter**.

USING THE RIBBON



The toolbar has been referred to as the ribbon. It organizes commands into tabs depending on their functionality and shows them as icons in a strip. Meanwhile, before we get started, there are certain things you can't change in Excel. They include:

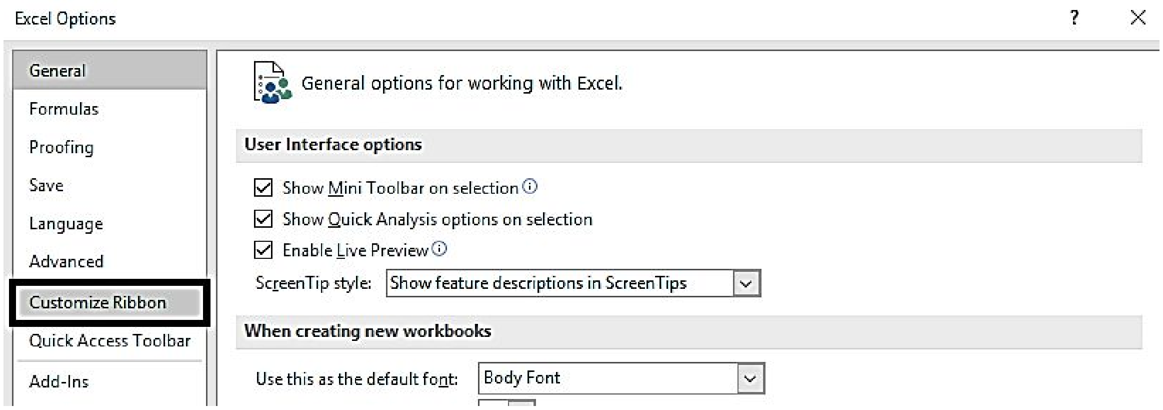
- Built-in commands cannot be changed or removed. ***(NB: You may, however, conceal a whole group)***.
- The ribbon cannot be resized. The only visual option is to conceal (collapse) it fully.
- Text size, font type, and color selections are available right away. You may also use Excel schemes to change the backdrop of the ribbon

across all Office programs.

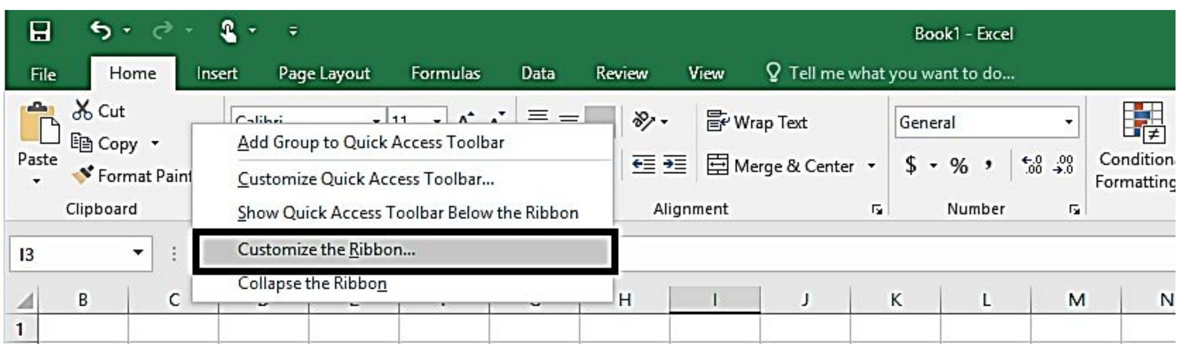
Customizing the Ribbon

You can customize the ribbon in your Excel. There are different techniques you can use to get to the customization options.

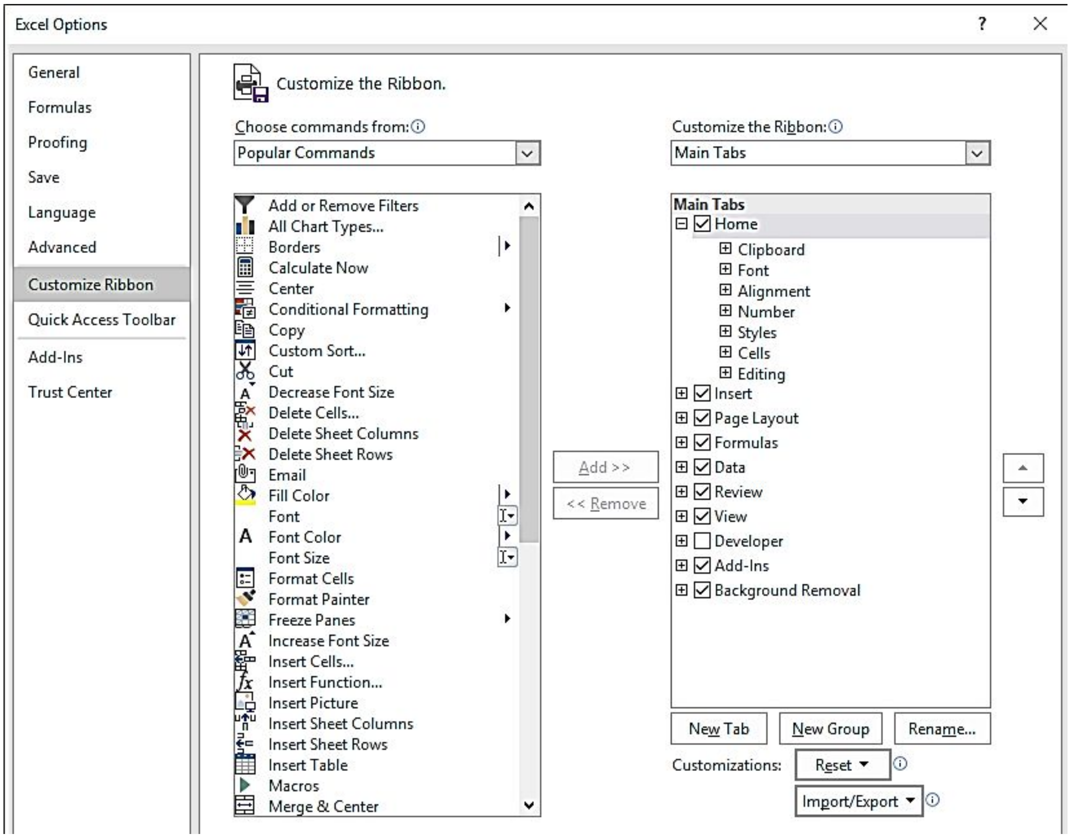
- Select **File > Options > Customize Ribbon** from the File menu.



- Right-click on the ribbon and pick **Customize the Ribbon**



The window gives you lists of instructions to choose from. In contrast, the one on the left provides all popular commands, the right side, lists the ribbon's main tabs, groups, and commands.

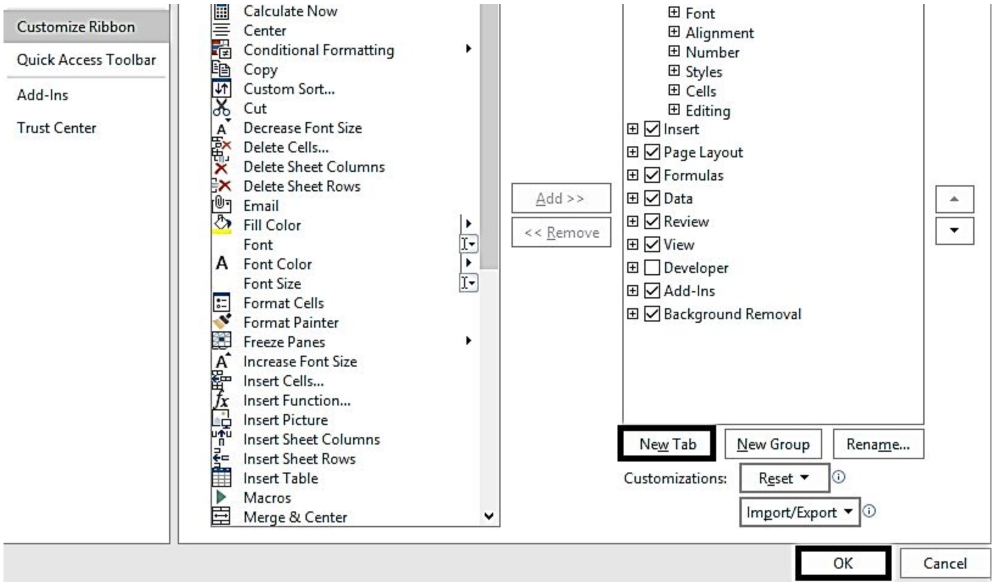


Ribbon Tabs

This is where you make some changes to your worksheets. You can insert a new tab, create a new group, add a command, changes the names and positions of tabs, groups, and instructions.

Inserting a new tab

Go to the right-hand list and choose **New Tab**. The new tab and group are created when you click the button ***(NB: A tab should always have a minimum of one group. Otherwise, you won't add commands)***. Use the Rename button to rename a tab or group.

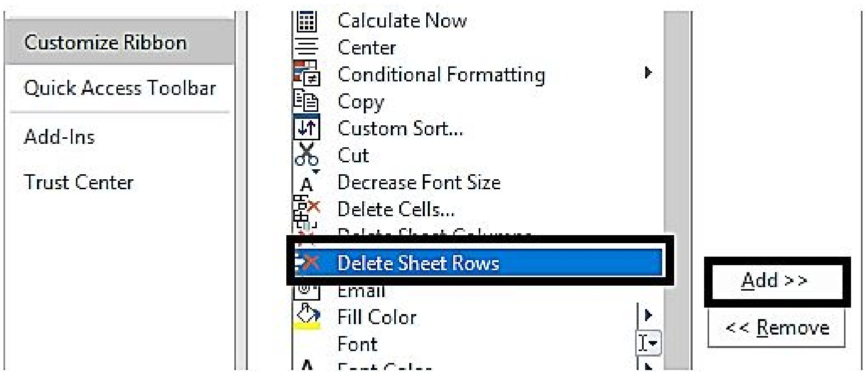


Creating a new group

Choose the tab you want to add a group, then, select **New Group**.

Adding a command

Commands can be added only to custom groups. As a result, begin by picking a custom group from the appropriate list. So, on the left side, choose the command. Choose commands from the menu above to filter the list. To add the command to the specified group, click **Add** >>. When you're finished, click **OK**.



Changing the names of ribbon tabs, groups, and commands

The Rename button, as previously indicated, may be used to rename tabs, groups, and commands. However, when it comes to built-in things, your selections are restricted. Although you may change built-in tabs and groups, none of the built-in commands can be renamed. Except for the File tab, that is. Symbol selection, on the other hand, is not possible for built-in tabs and groups.

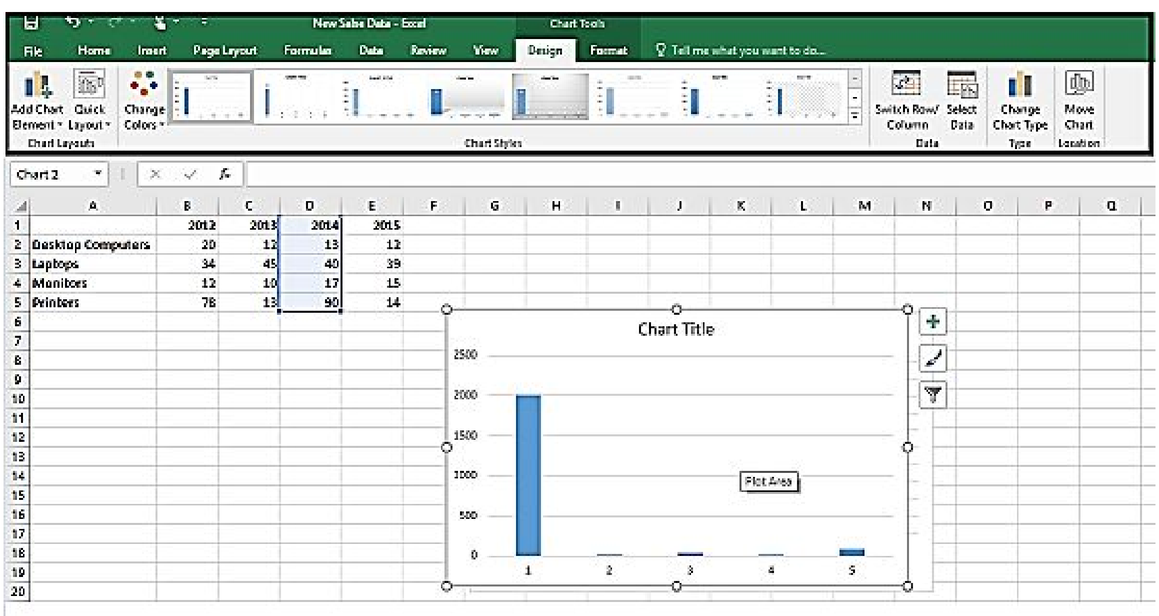
Changing the position of tabs, groups, and instructions

You can rearrange the tabs, groups, and instructions on the ribbon in Excel. You may take one of the following approaches:

- On the right side, use the arrow buttons. Select the object you want to move and then click the arrow that indicates the direction you want it to go.
- Make use of drag and drop. Move the mouse by clicking and holding the mouse button on any object.

Contextual Tabs

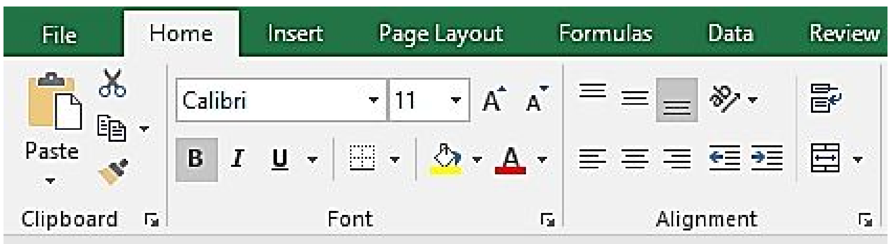
When you create or update an object in Excel, such as a chart, table, or diagram, contextual tabs appear. The contextual tabs provide you with the choices and tools you need when working with these things, and they are then cleared away when you click out of the object. To restore them, just click on the item, and the tab will appear. It keeps your workspace free of clutter.



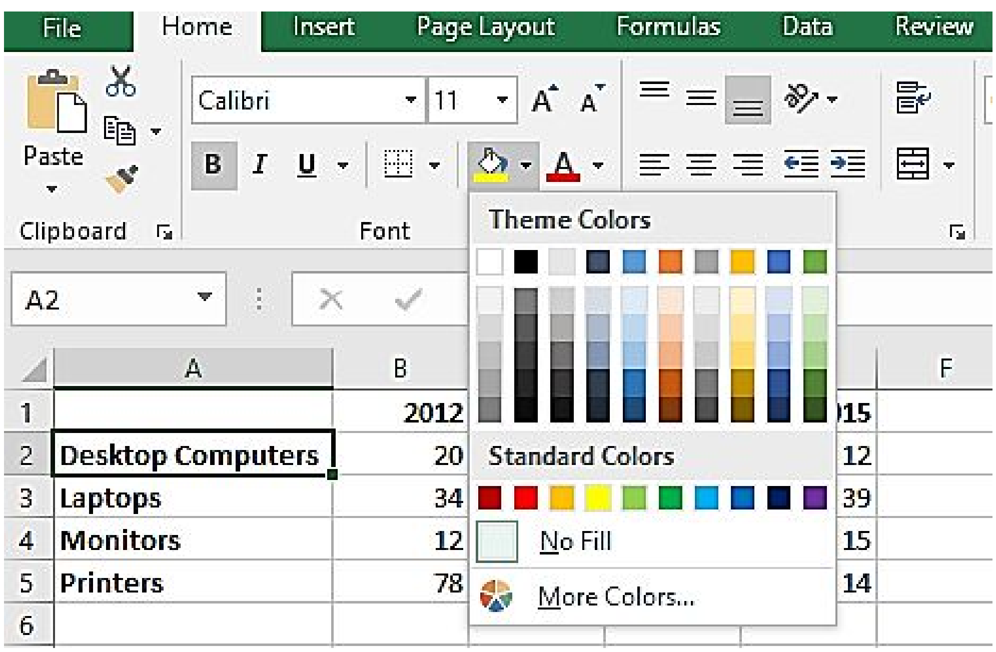
Types of Command on the Ribbon

There are 5 main types of commands on the Excel ribbon. They are; Toggle buttons, Drop-Down buttons, Tick Box, One-Click, and Split Buttons.

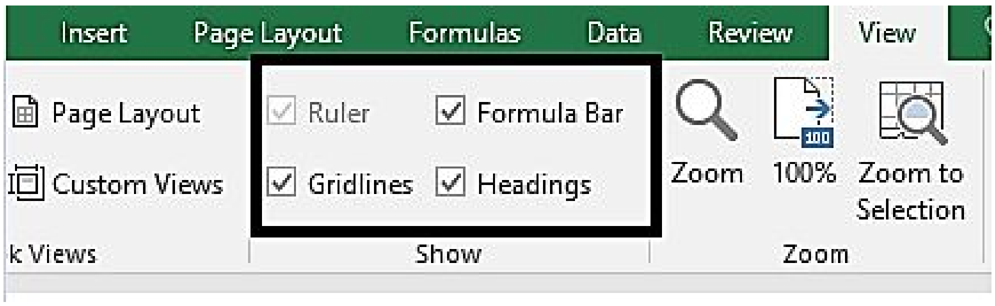
Toggle Buttons: With these buttons, you can adjust a cell. When you use this button to a cell, Excel will let you know the button you have applied (you will see the button highlighted with a particular color). Most times, when you have applied different formats to your cells, this button helps you to know the formats you have applied.



Drop-Down Buttons: These are those little arrows that are next to a particular button. When you click on the arrow, it gives you an extra list of applicable change options that you can use to make changes to a cell. For example, when you click on the arrow next to the Fill Color button, you will see a list of different colors that you can apply to the selected cell.



Tick Box: This box is more like the On/Off buttons. On these boxes, you can check and uncheck different box options. For example, when you click on the View tab, you will see some options there with the tick-box beside them. As you can see in the image below;

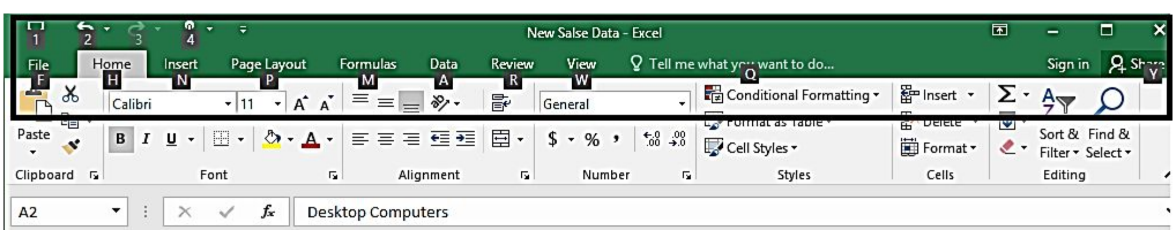


One-Click: These are those commands on the ribbon that when you click on them once, act immediately. Let's look at the **Text alignment** option for an example. Select a cell and click on it, it aligns the cell immediately. Same with the **Bold button**, **Italic button**, or the **Increase** and **Decrease** font size buttons.

Split Buttons: These are buttons that consist of the drop-down option and one-click option i.e. you can click on the button to act immediately and you can also click on the drop-down arrow next to the button to select from the list of other options.

Accessing the Ribbon by using your Keyboard

You can easily access the ribbon using your keyboard. To do this, simply press the "Alt key" on your keyboard. When you do this, you will see different letters on the ribbon. Each of these letters will be displayed on a particular tab on the ribbon. When these letters appear, press any of the letters on your keyboard and it will open up the menu of the tab you pressed.



USING SHORTCUT MENUS

Using keyboard shortcuts into your Excel routine is one method to speed things up. Excel specialists seldom use a mouse since it takes more time and is often imprecise. Many key combinations, or instructions, are already incorporated into the application, allowing you to perform actions. Depending on their function, all of the accessible shortcut keys may be grouped into numerous categories.

Shortcuts for formatting data

Combinations of the Control key + Shift key with extra characters may be differentiated as a distinct category of data formatting fast commands.

- **CONTROL KEY + W** — This command will dismiss the current worksheet immediately.
- Save the working document by pressing **CONTROL KEY + S**.
- Create a new working document by pressing **CONTROL KEY + N**.
- **CONTROL KEY + X** – copy the contents of selected cells to the clipboard.
- Open a working document by pressing **CONTROL KEY + O**.
- **CONTROL KEY + V** - this shortcut pastes data from the clipboard into the previously selected cell.
- **CONTROL KEY + P** – brings up a window with printing options.
- **CONTROL KEY + Z** is a command that can be used to undo a previous action.
- **F12** - this key saves the current working document as a new name.
- **CONTROL KEY + T** - This key combination allows you to generate a new worksheet from a single cell and a range of cells around it.
- **CONTROL KEY + 1** – Opens the cell formatting dialog box from the table.

Data entry shortcuts

- **CONTROL KEY + D** – this command copies the contents of the first cell in the marked range and pastes it into all subsequent cells.
- **CONTROL KEY + Y** – the command will, if feasible, repeat the previous action.
- Add the current date using **CONTROL KEY + ;**
- If edit mode is open, ALT + enter inserts a new line within the cell.
- Change the indicated cell using **F2**.

- The Paste Special Docker is opened by pressing **CONTROL KEY + SHIFT + V**.

Data View and Navigation

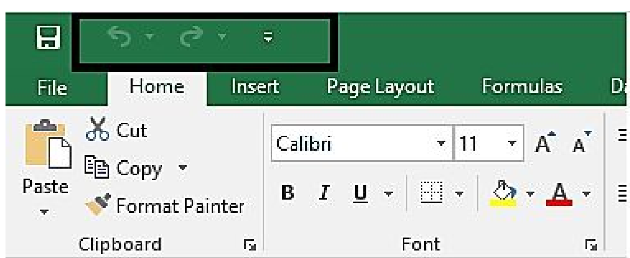
- CONTROL KEY + G (Go to) – opens the "Go" window on the screen.
- You may navigate to the next worksheet by pressing CONTROL KEY + PgDown.
- CONTROL KEY + END - Go to the end cell of the current sheet immediately.
- The Find dialog box is opened by pressing CONTROL KEY + F.
- Switch between workbooks by using CONTROL KEY + Tab.
- Hide or reveal the ribbon with tools by pressing CONTROL KEY + F1.

Data selection

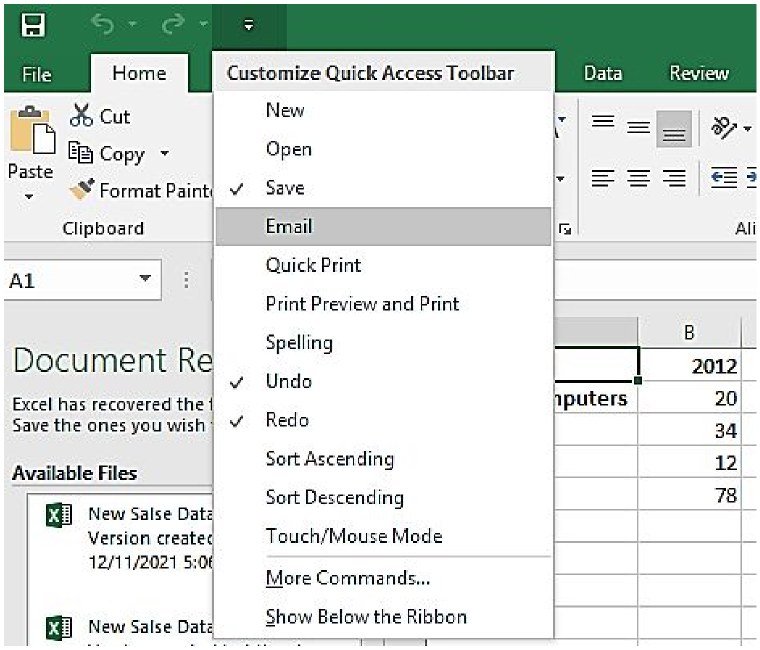
- SHIFT + Space – Selecting a whole line
- CONTROL KEY + Space – Selecting a whole column
- CONTROL KEY + A – Selecting the whole worksheet.

CUSTOMIZING YOUR QUICK ACCESS TOOLBAR

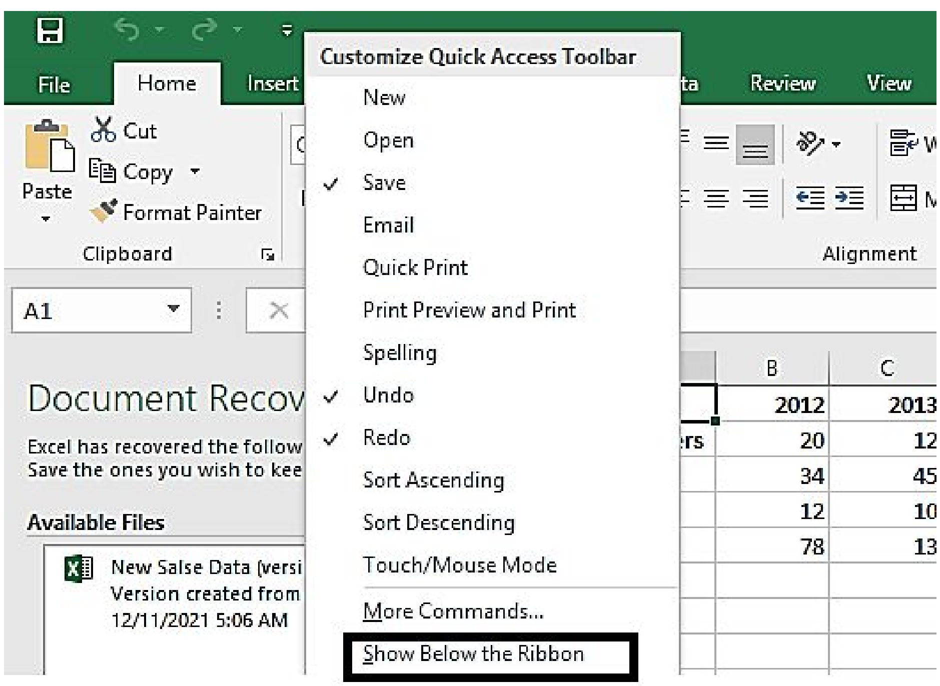
The Quick Access Toolbar is a resizable toolbar that includes a collection of instructions that are not reliant on the current ribbon tab. You may add buttons that indicate instructions to the Quick Access Toolbar.



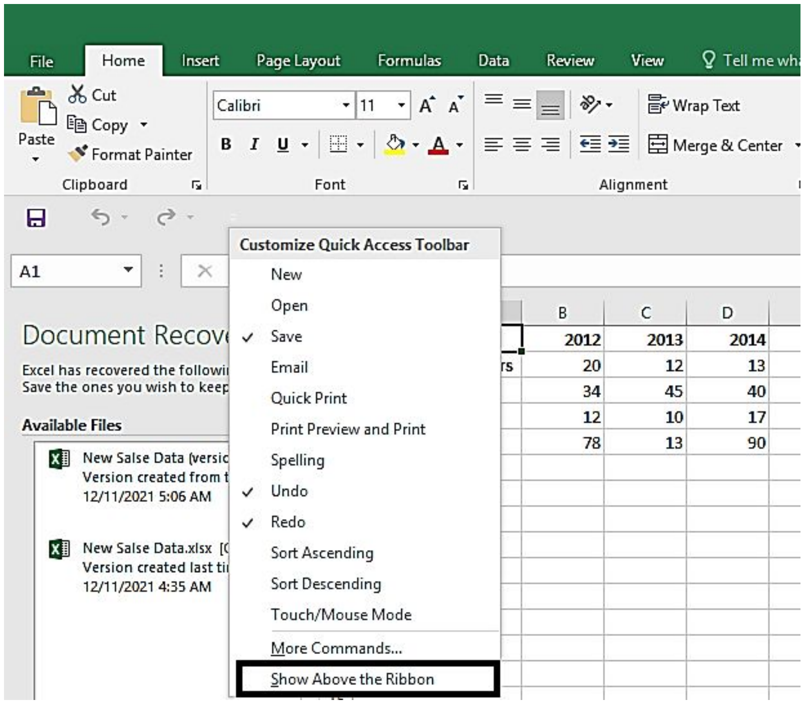
Select the drop-down arrow on the Quick Access Toolbar, it shows a list of commands that you can add to the toolbar. When you click on any of the commands, it will display in the Quick Access Toolbar.



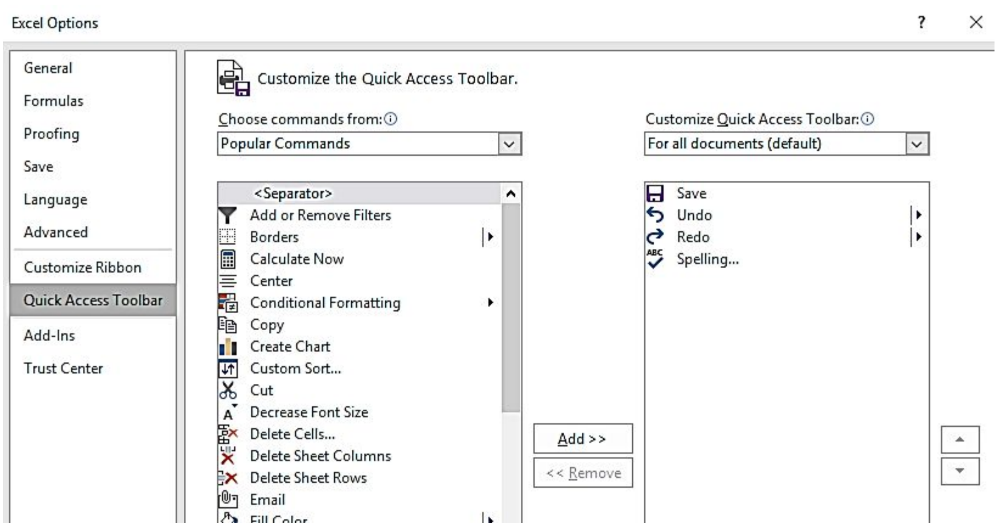
Move the Quick Access Toolbar: You can move it to two places; Below the ribbon or Above the ribbon. To change the location of your quick access toolbar (if it is currently above the ribbon), click on the drop-down arrow, then select **Show Below the Ribbon.**



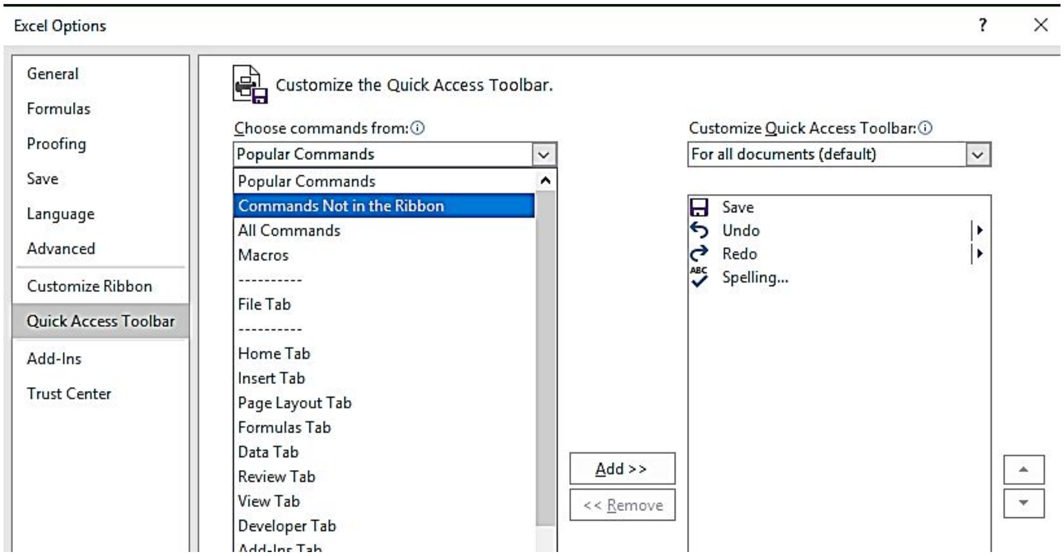
Follow the same steps above then select **Show Above the Ribbon**.



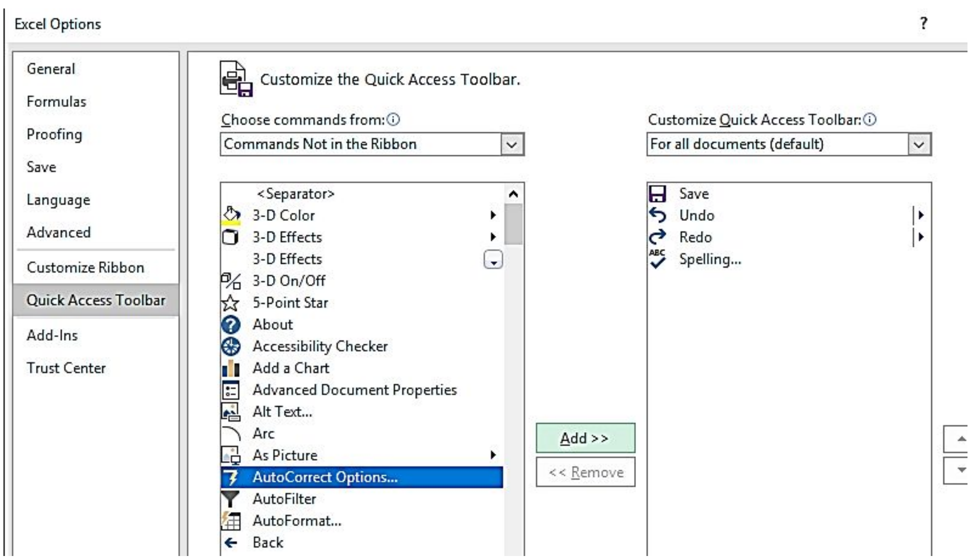
Not all commands are displayed in the lists. So, simply click on the drop-down arrow and select **More Commands** and this will display a window where you will see other commands options.



Click the arrow under the "**Choose commands from**" option. This will display different command options.



Select an option and choose a command. Then click **Add>>**. You can also remove a command by clicking on the **<< Remove button**.

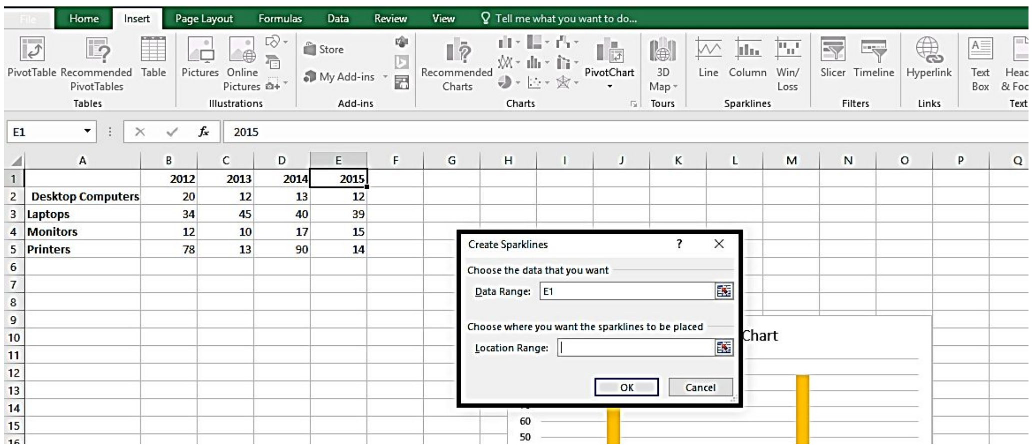


WORKING WITH DIALOG BOXES

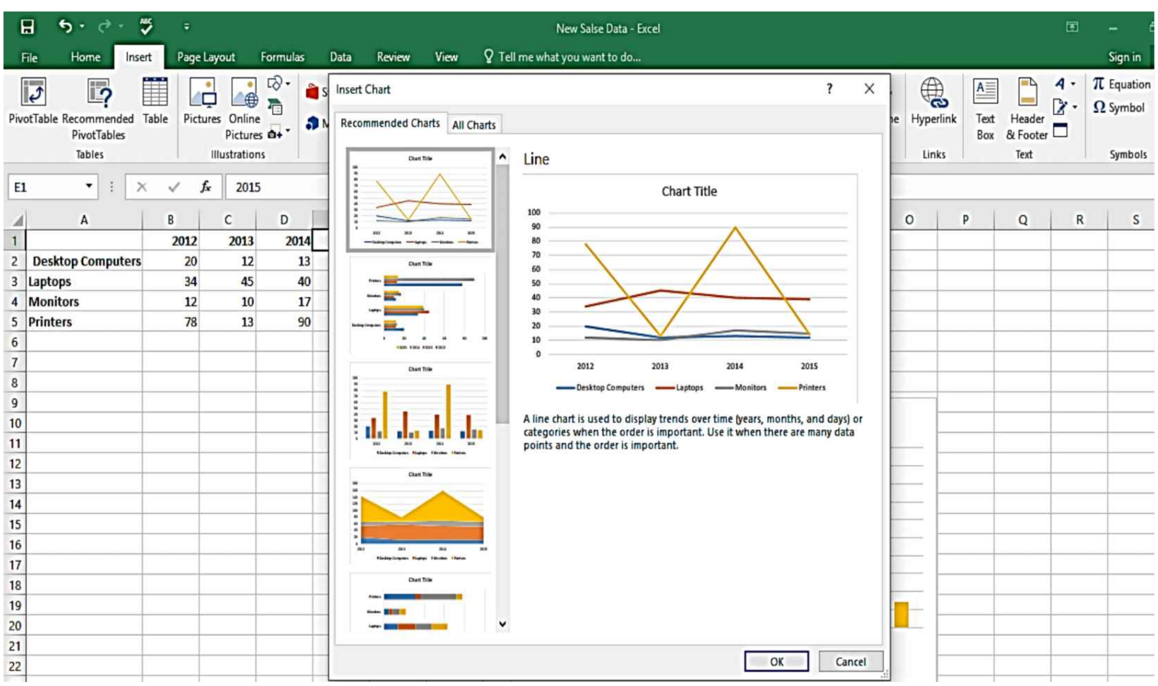
The box that appears is known as a Dialog Box. It is a transient window created by an application to collect user input. Dialog boxes are often used in applications to ask the user for further information about menu options.

In Excel, when you click or make use of some commands in the ribbon, it displays a box where you see other options for that command. Excel features a lot of dialog boxes that you'll use a lot, such as Format Cells, Spelling, Past, Find and Replace, etc. There are types of dialog boxes.

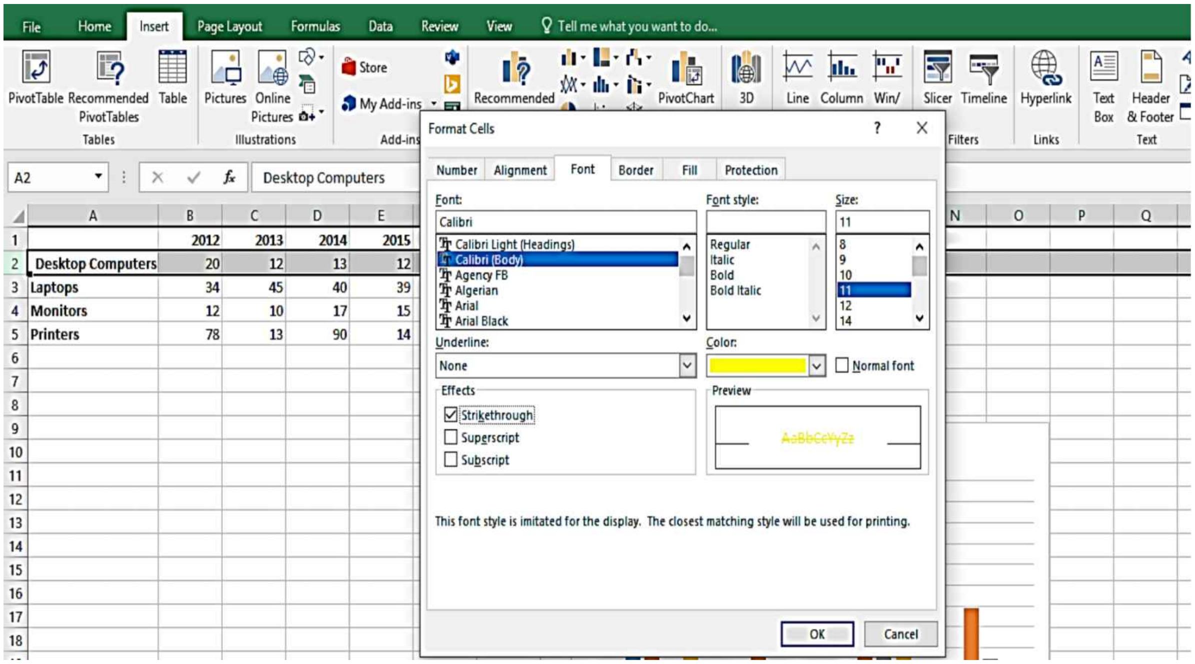
Typical Dialog Box: If this box appears on your screen, it doesn’t go away by itself until you decide to close it. when it appears, perform your action, then you click **OK**. If you want to dismiss the box, click on the **Cancel** button. This will close the dialog box immediately and no action will take place. The image below is a Typical dialog box.



Navigating Dialog Boxes: This box appears when you click on a command that you want to use. You can easily see them from the list of commands on the Insert Tab.



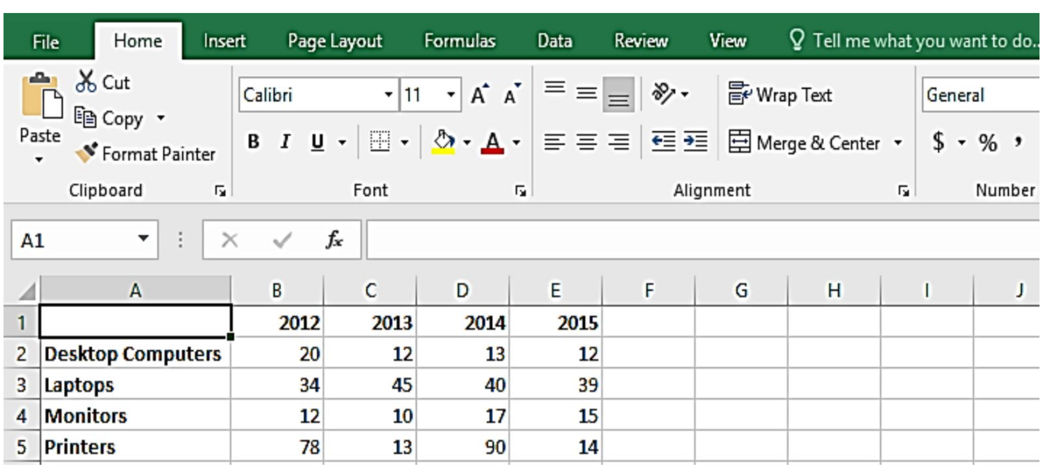
Tabbed Dialog Boxes: Many of the dialog boxes in Excel are Tabbed dialog boxes. It has several commands on it. You make the changes you want, and once you are done, click **OK**.



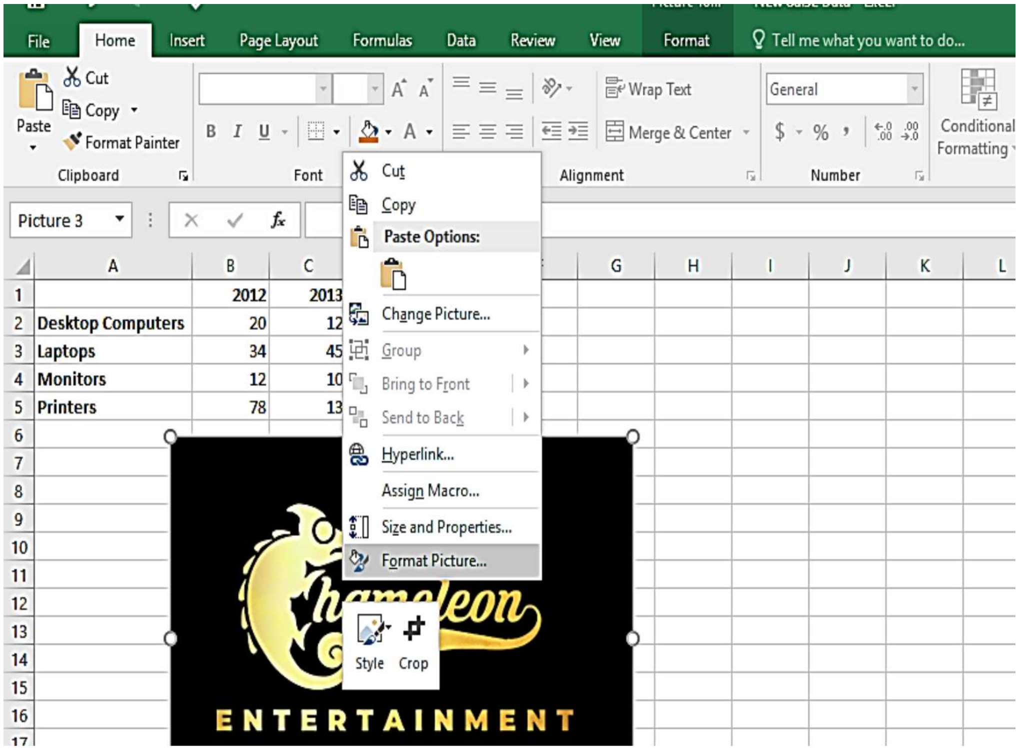
USING TASK PANES

In Excel, task panes are interface panels that display on the right side of the window. It provides users with easy access to common features, data, and instructions. Below is an example.

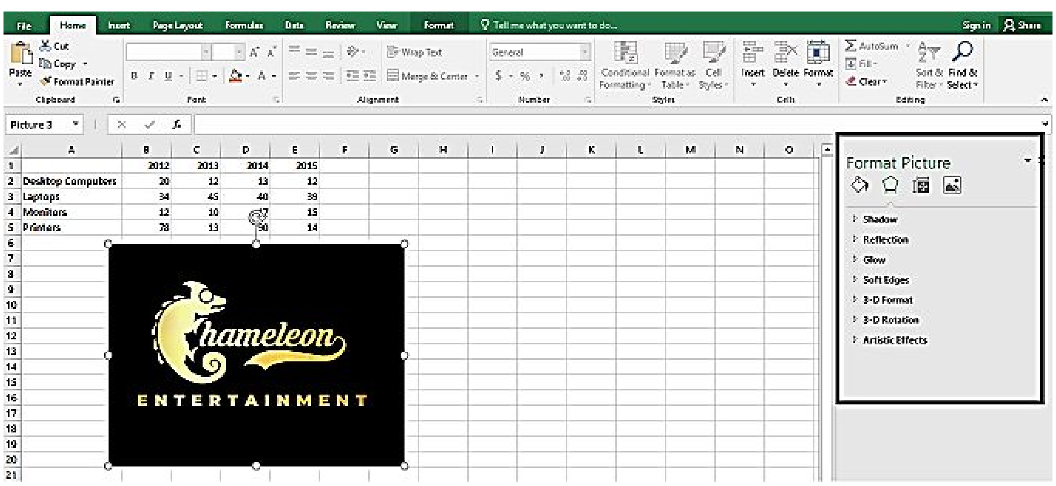
Open an excel sheet (It should have some details in it).



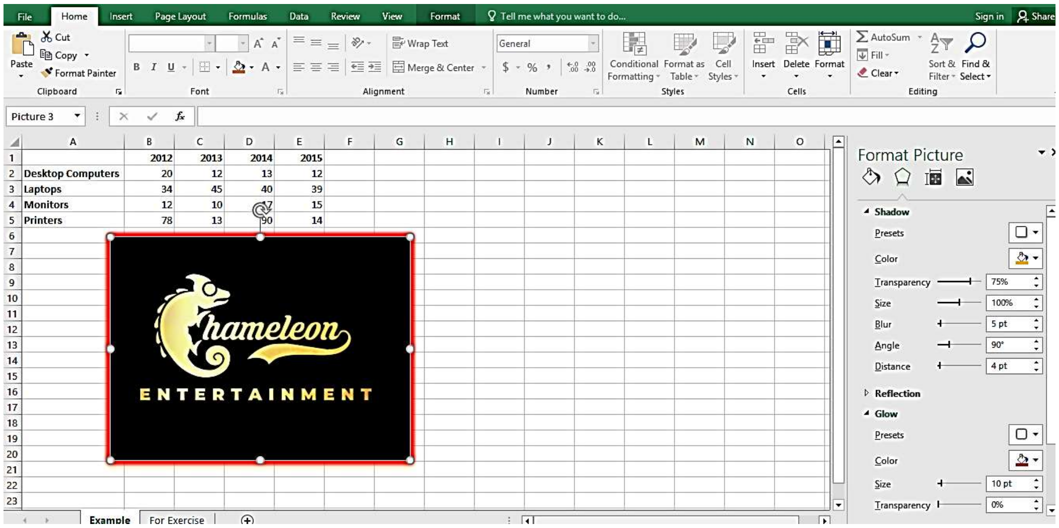
Now, let's insert a picture. Click **Insert** > **Pictures** > Select the picture you want, then click **Insert**. Once the picture has been displayed on the worksheet, right-click on it and select **Format Picture**.



This will open up the Format Picture Task pane. You will see lots of options you can select from in the Task Pane.



Click on an option. As you make the changes, you will see the picture adjusting to the changes you have made.



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Formulas
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Review
View
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Share
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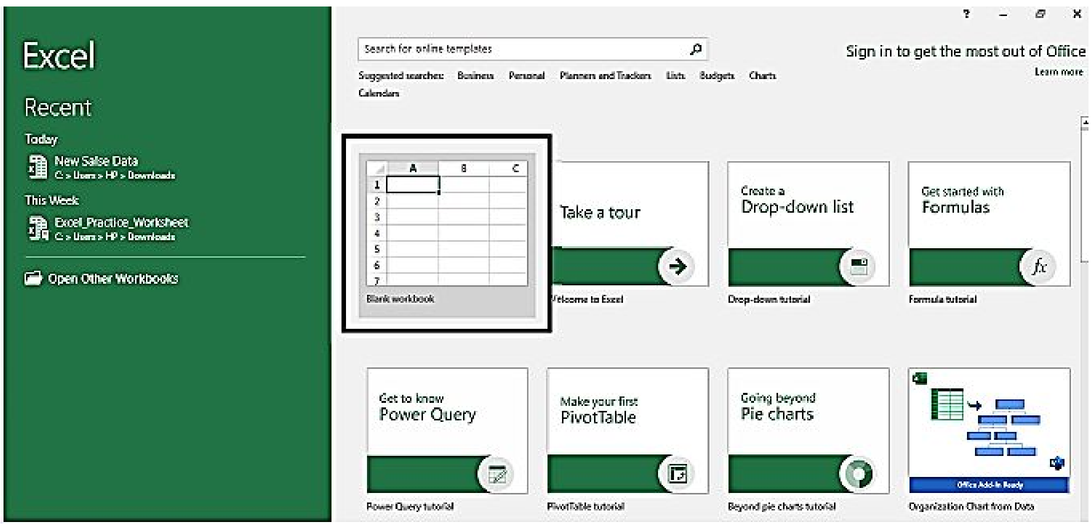
Font
Wrap Text
Merge & Center
Alignment
General
Number
Conditional Formatting
Format as Table
Cell Styles
Styles
Insert
Delete
Format
Cells
AutoSum
Fill
Clear
Sort & Filter
Find & Select
Editing
Picture 3
Desktop Computers
Laptops
Monitors
Printers
2012
2013
2014
2015
Chameleon
ENTERTAINMENT
Example
For Exercise
Format Picture
Shadow
Presets
Color
Transparency
75%
Size
100%
Blur
5 pt
Angle
90°
Distance
4 pt
Reflection
Glow
Presets
Color
Size
10 pt
Transparency
0%

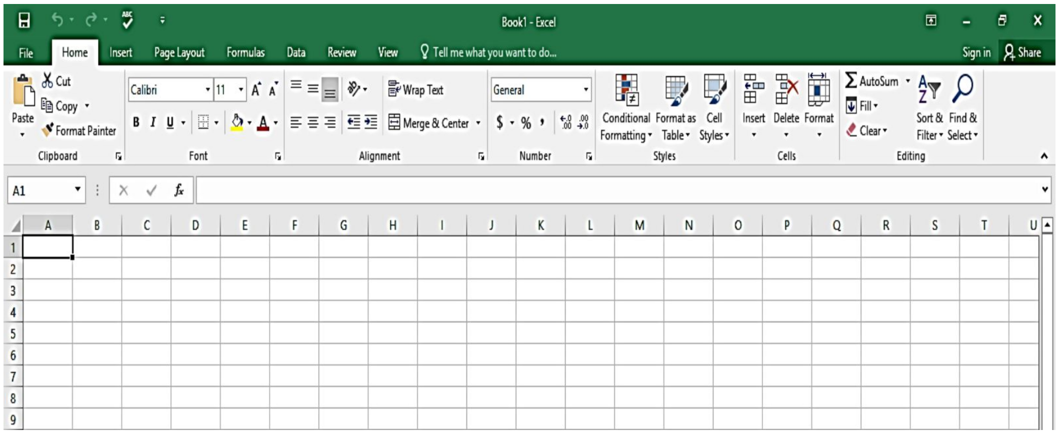
CREATING YOUR FIRST EXCEL WORKBOOK

You'll get a welcome screen when you first launch Excel, where you can select to access an already Excel spreadsheet or you create a new one. You may create a fresh, blank worksheet or a ready-made workbook using a template on Excel's welcome page. For the time being, click the "**Blank workbook**" icon to create a new spreadsheet without any formatting or data.



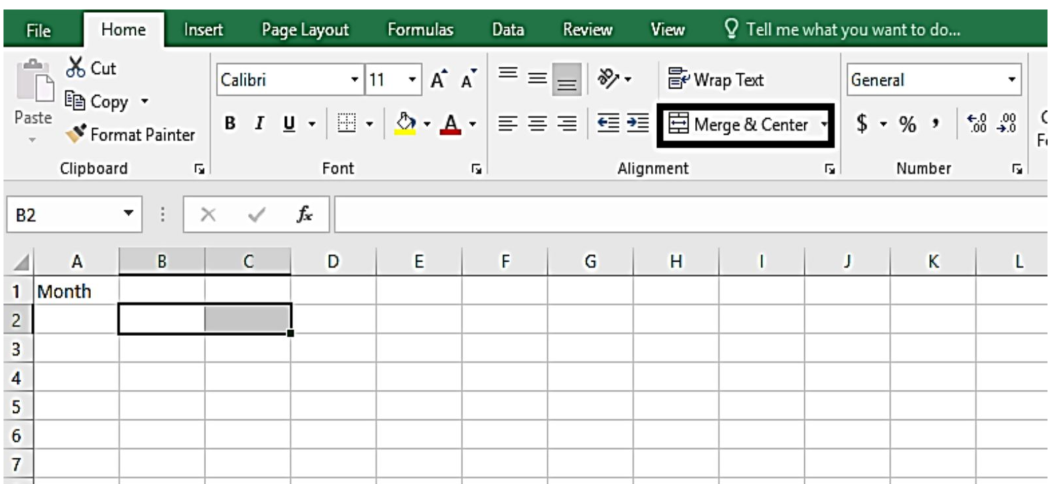
Getting Started on Your Worksheet

A worksheet is a grid of cells into which you may write data and formulae. The grid occupies the majority of the Excel display. It's where you'll do everything from inputting data to developing formulae to evaluating the outcomes. The worksheet consists of rows and columns gridlines and is labeled with numbers and alphabets.

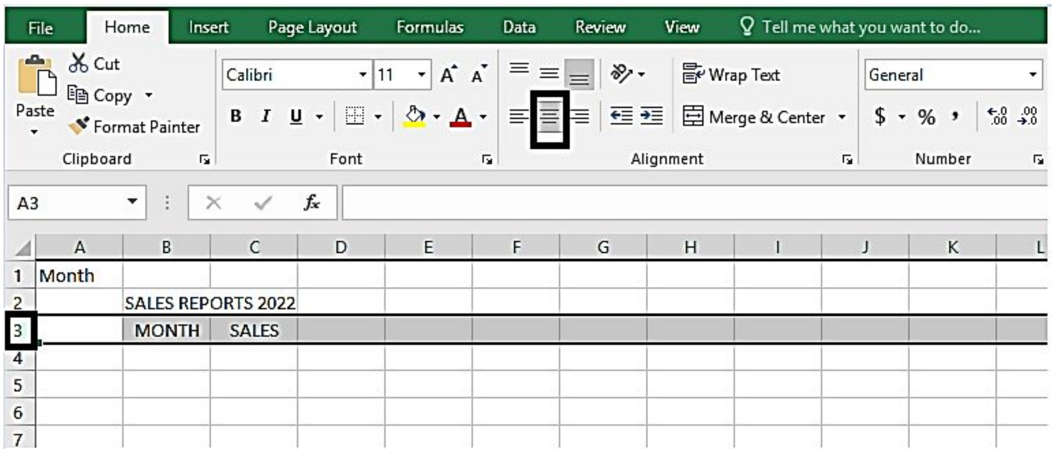


Filling in the Month Names

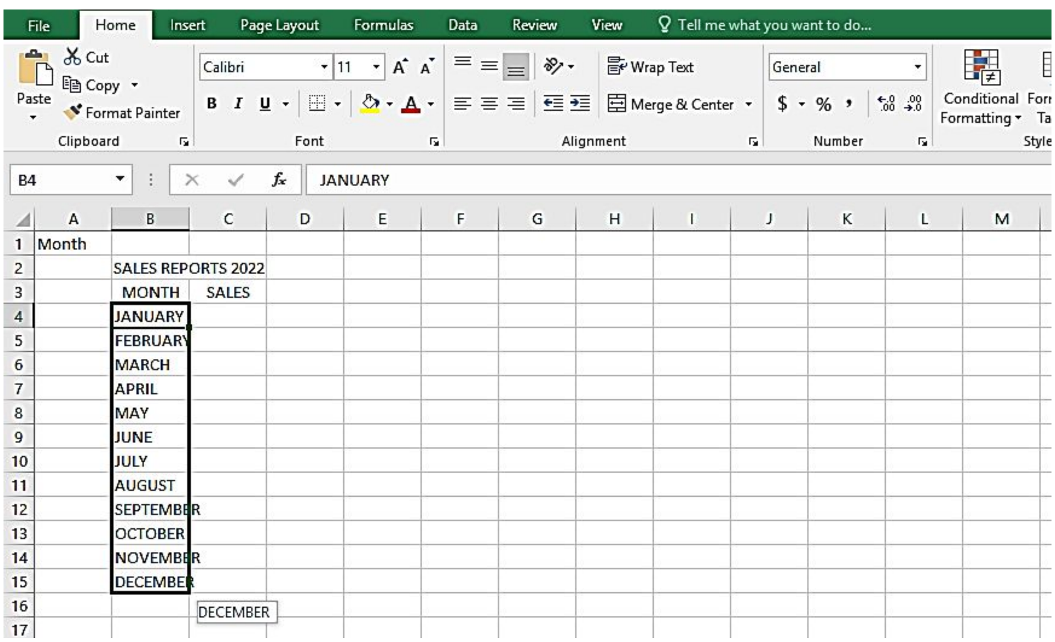
Now, we are going to fill in some data. First, select **Cell B2** and **Cell C2** at the same time. To do this, click on Cell B2, and why holding the left-click button on your mouse, move the cursor over Cell C2. This will select both cells. Now, on the Home tab, select **Merge & Center** from the ribbon which will merge both cells into one cell.



Now, click on the merged cell and type in Sales Report. Now, activate cell B3 and type in the word Month. Activate cell C3 and type in the word Sales. Now, select cell C3. In the alignment group, select the **Center command**.

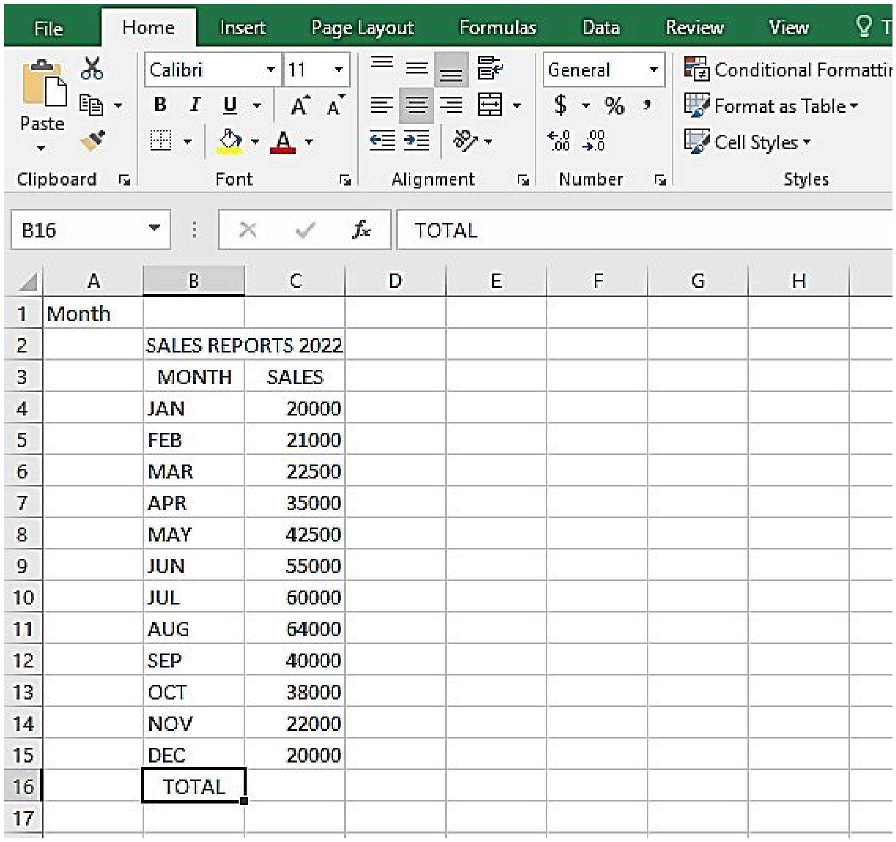


Now, activate Cell B4 and type in **JANUARY**. Then, on the small square box on the bottom right of Cell B4, click and drag down to 11 rows (**B15**). Once you've done this, Excel will automatically complete the rest of the months for you instead of making you type the months because it recognized January.



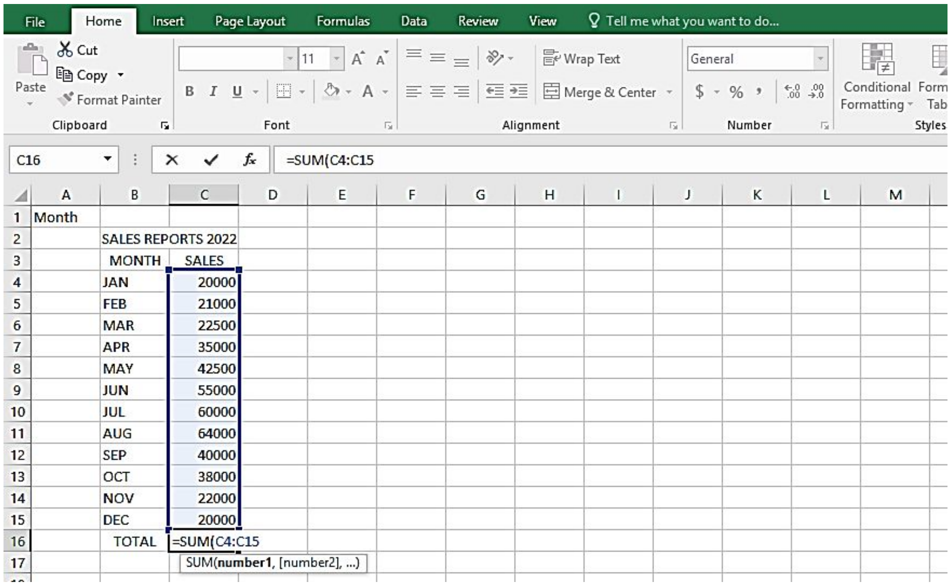
Entering The Sales Data

Now, enter the following numbers (as you can see in the image below) into C4 and C15 in the exact following format without dollar signs or commas. Then, activate cell B16 and type in Total and then center it.

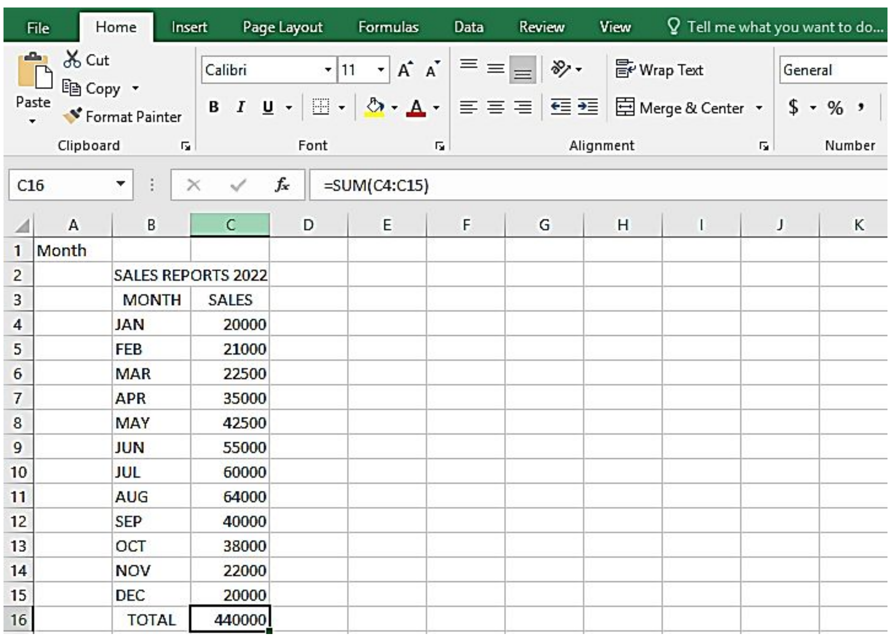


Summing the Values

The SUM function is used for summing values. we will apply it in cell **C16**. Activate cell C16 and enter in the equal sign, sum, and left parenthesis. Then select cell C4 to cell C15 and close the parenthesis. The contents within cell C16 should be as follows: **=sum(C4:C15).**

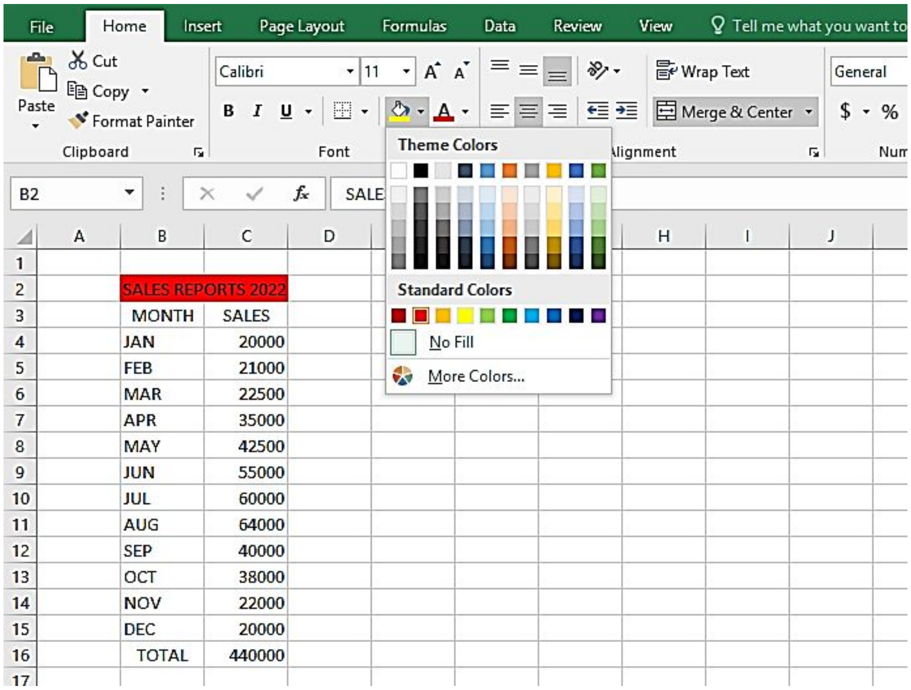


Then, press ENTER, and this sums up the monthly sales.

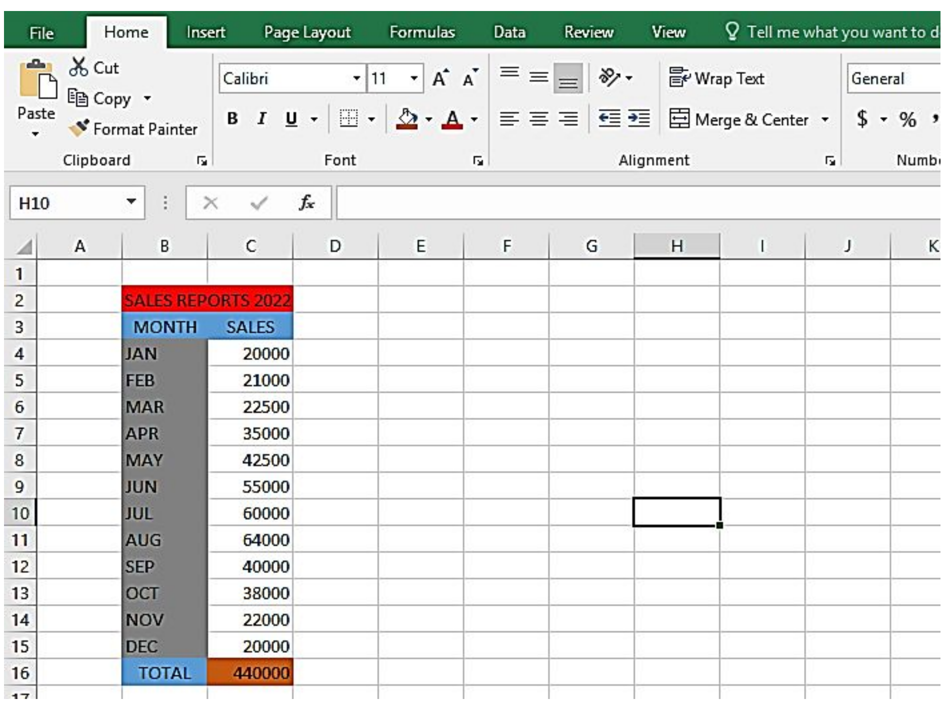


Making Your Worksheet Look a bit Fancier

Select **Cell B2** and **C2**. Click the down arrow on the fill color command on the ribbon and select a color. This will color the title of the table.

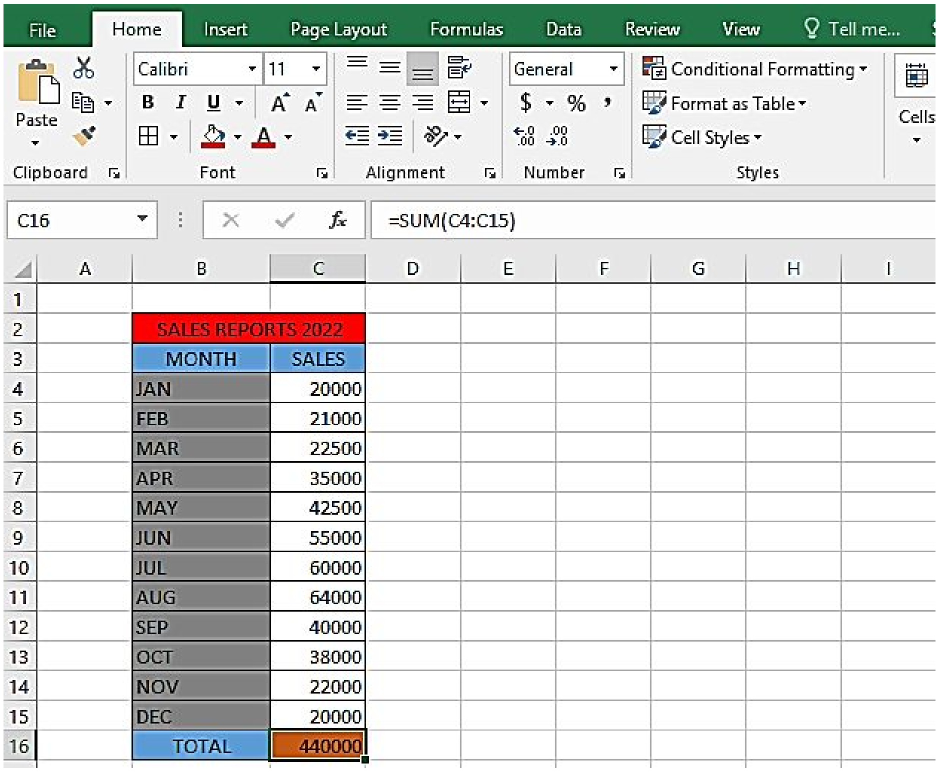


Now, select cells B3, C3, and B16 which are the Month, Sales, and Total. Repeat the same steps above but pick a lighter color. Repeat the same steps for cells **B4** to **B15** which are the Months. Finally, select cell **C16** and fill it with a very light color to differentiate it from the rest of the Sales number.



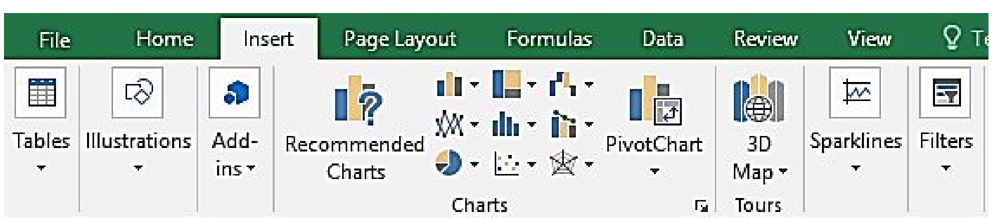
Now, let's add a border

Select cell B2 through cell B16 (the entire **Sales report)**. Select the down arrow of the border command and select **All Borders**. There are other border options there as well.

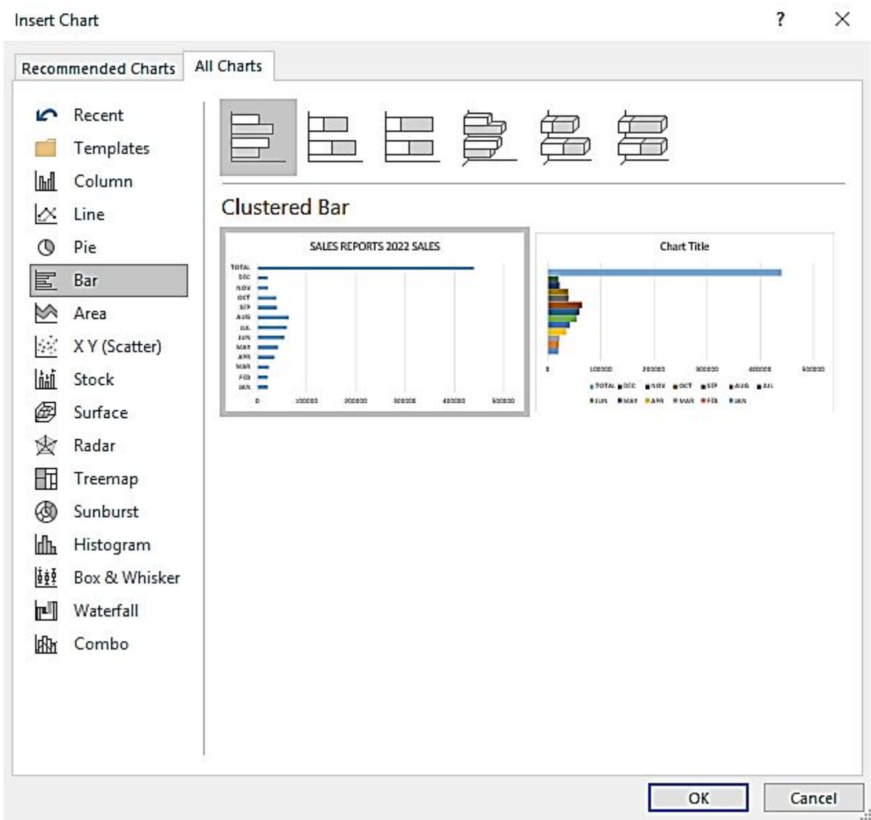


Creating a Chart

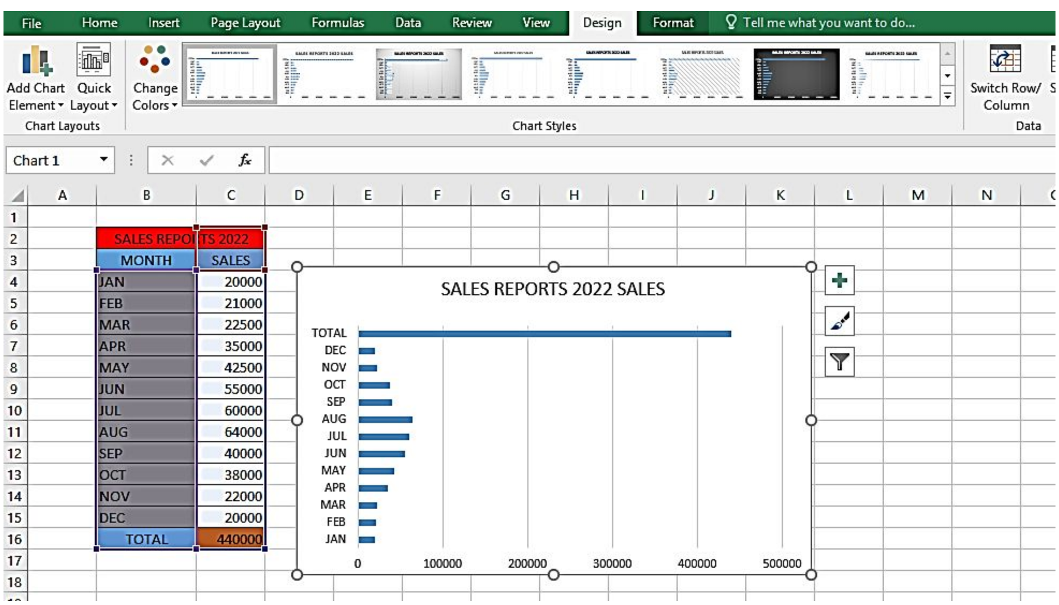
Now, choose the cell you want to create a graph for. To do this, click and drag your mouse across the cell. Once you've done this, click on the Insert Tab on the ribbon. You will see the chart command menu on the Insert tab options.



You can create different charts for your work. In this case, we will create a bar chart. Click on **Recommended Charts** > **All Charts**. Then, select **Bar**. Click **OK**.

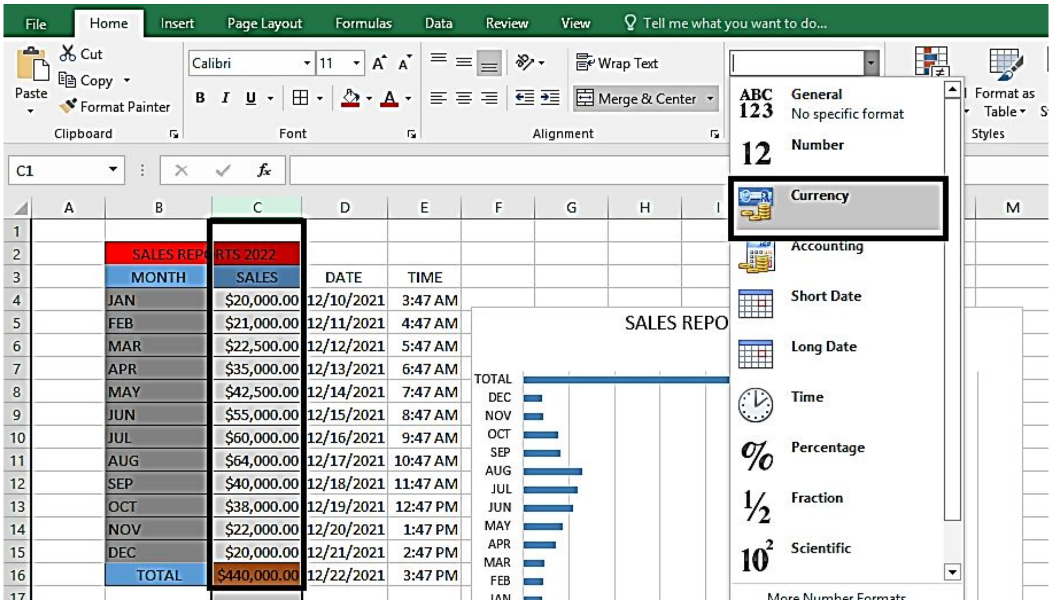


This will immediately create a pie chart for your work.



Formatting the Numbers

Select the cell > click the down arrow on Number group and select any number format option. you want. Click on More Number Formats for more formatting options. On the image below, I formatted the numbers to Currency (Dollar).



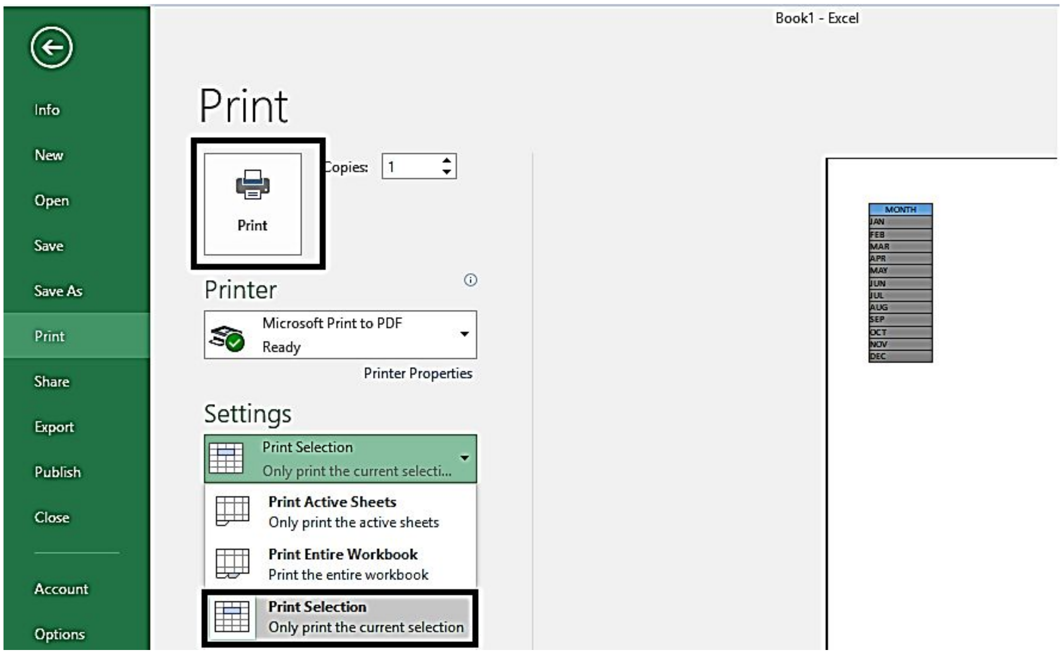
Printing your Worksheet

Excel sheets might have much information, and printing it all at once isn't always practical. By identifying the desired region, navigating to the print options, and selecting the 'print chosen area' option, you may print specific areas of a spreadsheet. Printing selected sheets in a workbook may be done similarly. "**Print Areas**" may also be utilized by people who want to fine-tune their formatting before printing. There are different methods you can use in printing your worksheet.

Printing from a Selection

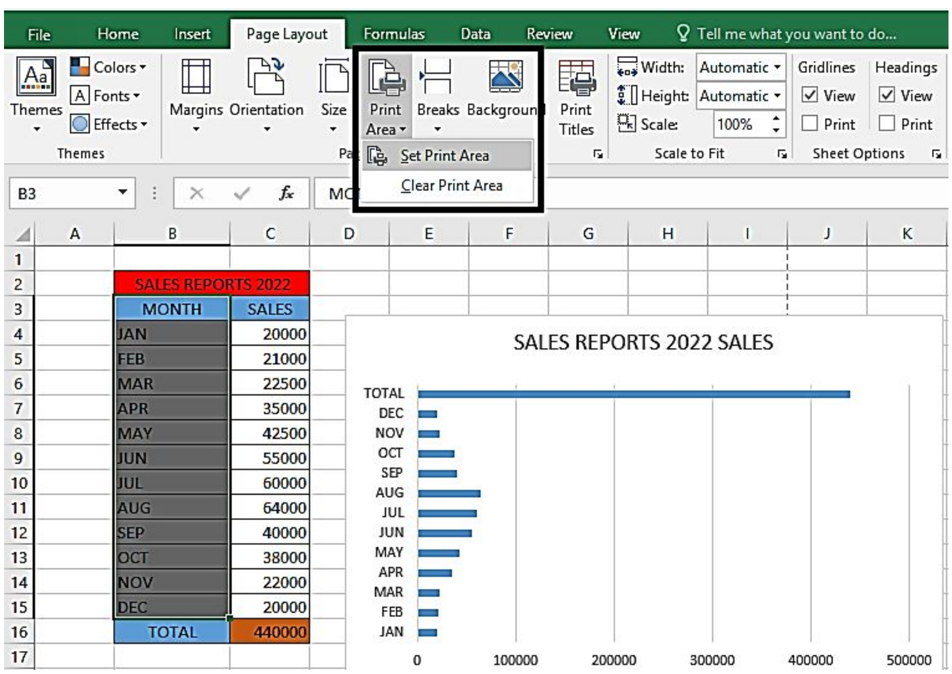
Highlight the cell(s) you want to print. Click on **File** and choose **Print**.

On the Print Setting menu, hit the down arrow and select **Print Selection**. Then, click on **Print**. This will print out only the selected area in your spreadsheet.



Using a Print Area

Highlight the cell(s). Click on Page Layout. Click on **Print Area**, then select Set Print Area.



The print area will be identified by the highlighted cells. You may continue working while this area is stored for future printing.

- The "Orientation" button allows you to move between landscape and portrait mode.
- On a printed page, the "Margins" button modifies the margins.
- "Scale to Fit" determines how many pages your printed material will occupy.
- From the same dropdown menu, you may clear, overwrite, or add to the print area.

Click on **File** and select **Print**. On the Print settings menu, select **Print Active Sheet**. Then, click on **Print**.

Saving Workbook

When you save a workbook for the first time, Excel will ask you to name it. Any modifications to the text, numbers, or formulae must be saved using the Save procedure once the file has been given a name.

- Go to **File > Save New Workbook**.
- Choose **File Save As**.
- A dialog window called **Save As** opens.
- Select a location for the file.
- Fill in the File Name: box with a name for your file.
- Select **"Save"** from the drop-down menu.

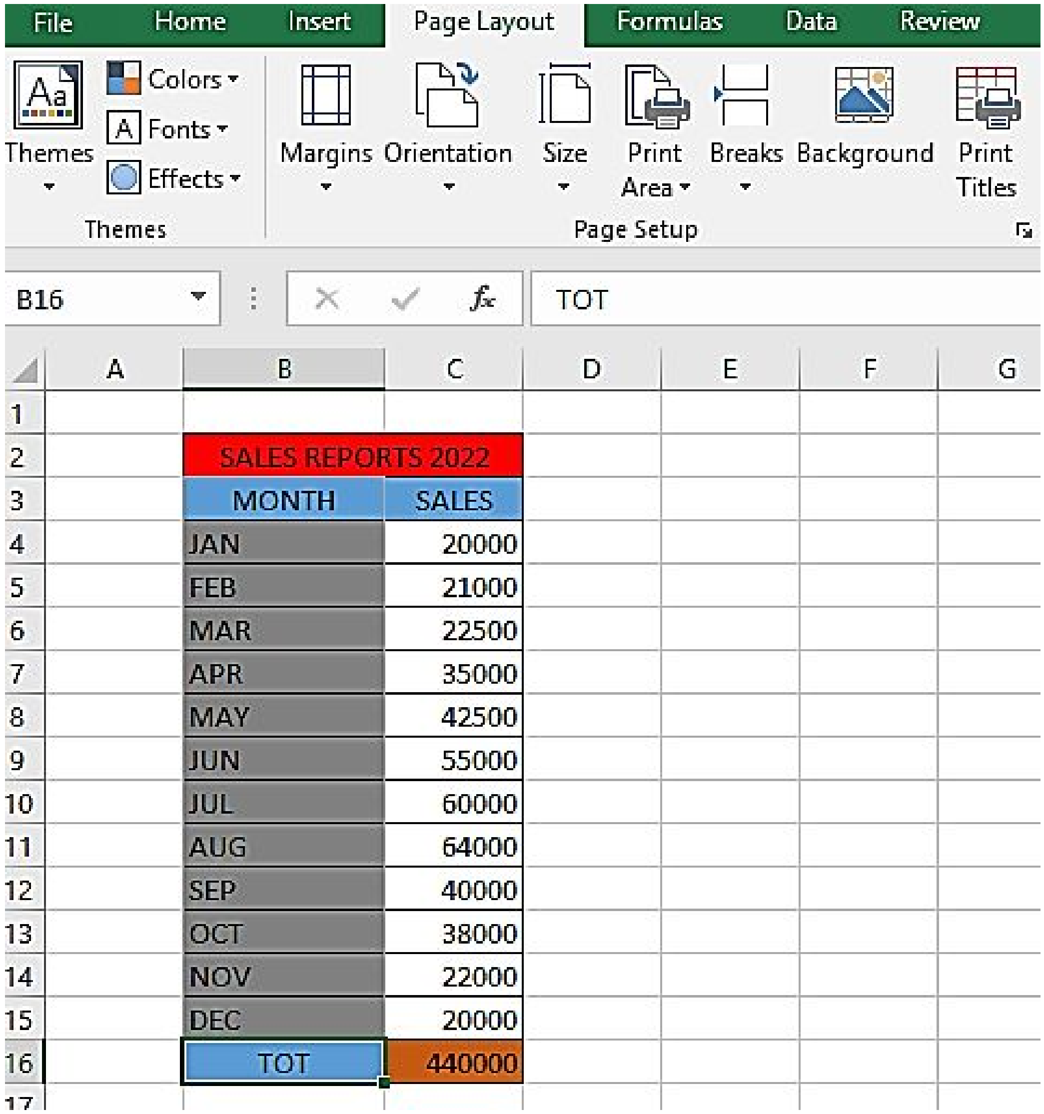
When working with a spreadsheet, it's a good idea to save it periodically. It's never pleasant to lose data. Using the shortcut key combination **Control key + S,** you may save your worksheet fast.

CHAPTER TWO

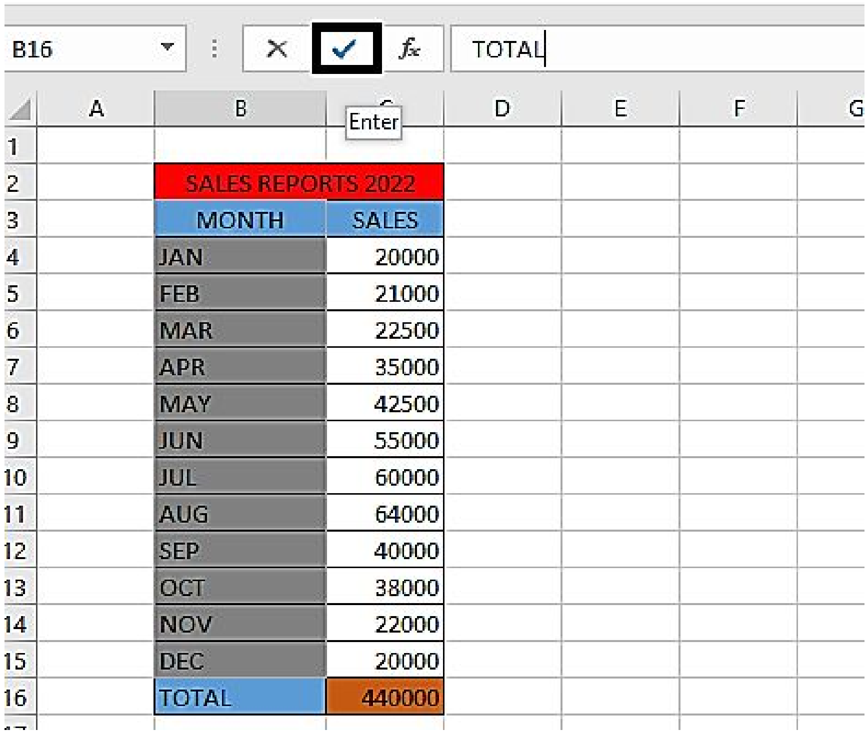
ENTERING AND EDITING WORKSHEET DATA

Double-clicking the cell location or using the Formula Bar may alter the data that has been put in it. You may have observed that the data you put into a cell location showed in the Formula Bar as you wrote it. The Formula Bar may be used to input data into cells as well as amend data that has previously been entered.

For example, click on cell B16, and type in the word Tot. Activate cell B16, then, on the formula bar, you will see the abbreviation, **Tot**.



So, click on it and complete the word to Total, then click on the checkmark icon on the left. This will change the word to **Total** in cell **B16**.



Exploring Data Types

In Excel, there is the Numeric data type, Text data type, Date and Time data type, and Formula data type.

Numeric values

The numerical data which are stored in Excel cells are used in building the majority of formulae in Excel. Numeric data is aligned to the right-hand side. Numeric data may be divided into two categories.

Numeric Data: Numeric data is used to keep track of amounts. 500 bags of cement, for example.

Date and Time: Date and Time values are stored using the Date and Time data type. Technically, Excel saves Date and Time as numbers as well. Date and time data, like numeric data, is aligned to the right-hand side. A date value, a time value, or both may be stored using the data and time data type. Depending on how you structure the Cell, the date and time value might appear in a variety of forms.

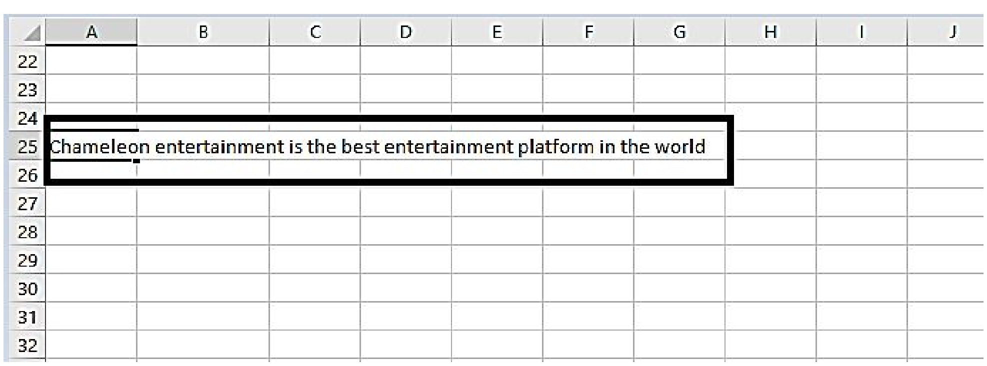
Excel's numeric data type is used to record various amounts that may then be utilized in mathematical operations using Excel formulae. Numeric characters (0 to 9) may be used in Excel cells with numeric data types. Aside from numeric characters (0–9), the special characters listed below may be used for many purposes.

+	Positive symbol
-	Negative symbol
()	Negative symbol
%	Percentage symbol
.	Decimal symbol
,	Decimal symbol
E	Exponential symbol

Text Entries

Text is any string of letters, digits, spaces, and characters. This is the most popular data type. Text is the only data type in Excel that is oriented to the left by default. It's mostly used to name table headings, descriptions, and other things. Although text can as well be a number, it should not be utilized in calculations. You may get a **#VALUE!** error if you endeavor to execute any mathematical operation with text data in a Cell. Customer names, customer numbers (using customer numbers in computations would be meaningless), and addresses are examples of the popular usage of the Text data type.

If the text data in an Excel Cell is bigger than the Cell width, the text data will flow over into the empty right-side Cells. If a right-side empty Cell is subsequently filled, Excel hides the spilled text before revealing the data in the new full Cell. See below.



Formulas

A formula is a set of instructions that are entered into a cell to generate a value. It must start with an equal symbol (=). A mathematical equation, cell references, functions, or an operator might all be examples. An expression is another name for a formula. Because MS Excel can build tables with a large quantity of data, you use this function to add formulae to your table and receive faster results. Following are some fundamental Excel functions to get you started, assuming you can now input and function with your favorite formulae.

SUM Formula: First and foremost, the SUM function in Excel is a must-know formula. Values from several columns or rows are often combined. =SUM is a simple selection that adds the column values (A2:A8). Example: Summing up the values of a single row, =SUM(C4-C15).

MEDIAN Formula: The average number of shareholders in a certain shareholding pool is an example of a simple average that the AVERAGE function should bring to mind. Example: The formula =AVERAGE is used to calculate an average (C2:C14). (SUM(C2:C14)/12) is likewise comparable.

COUNT Formula: The COUNT function keeps track of how many cells in a given range contain just numeric values. Example: COUNT is used to count the numerical values in a column (C: C). To count rows, you must change the range of the formula.

IF Formula: The IF function is often employed when you wish to sort your data according to a set of rules. Other formulae and functions may be true, for example, the value is true and false.

Example: =IF(C2D3, 'TRUE,' 'FALSE') – IF(C2D3, 'TRUE,' 'FALSE') – IF(C2D3, ' This method checks the two numbers to see whether C3 is smaller than D3. If the reasoning is right, the cell value should be TRUE; otherwise, it should be FALSE.

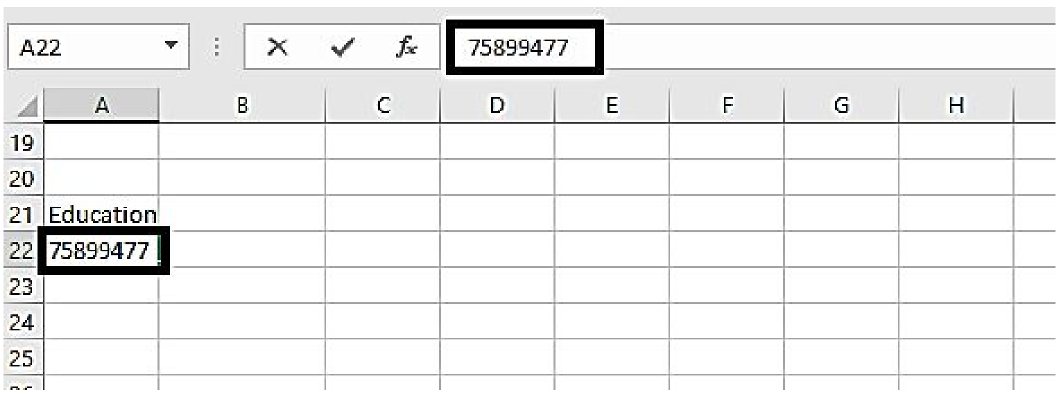
COUNTA Formula: COUNTA counts all cells in a given range in the same way as the COUNT function does. Regardless of cell type, all cells are counted. It counts the same things as COUNT: dates, times, strings (including logical values and errors), and empty strings or text.

Entering Text and Values into your Worksheets

Any cell may have either text or number. It might be difficult to input data if you haven't been taught how, so follow the steps below to discover the tips and tricks for efficiently entering data.

Entering Numbers and Text

To input numbers or texts, first of all, activate the cell by clicking on the cell, then input the value and hit **Enter** key. After inputting the value, activating the cell, you will notice that the value is shown in the cell likewise in the Formula bar.



A cell may carry up to 32,000 characters, which is more than enough for a normal chapter in a book. Despite a cell carrying a large number of characters, you'll discover that it's impossible to show them all. The formula bar may not fully display lengthy text. To expand the height of the Formula bar and show additional text, click the bottom of the Formula bar and drag it down.

When inputting values, especially numbers, you may use decimal points, currency symbols, mathematics symbols, etc. excel considers a value to be negative if it is preceded by a minus sign or it is enclosed in parenthesis.

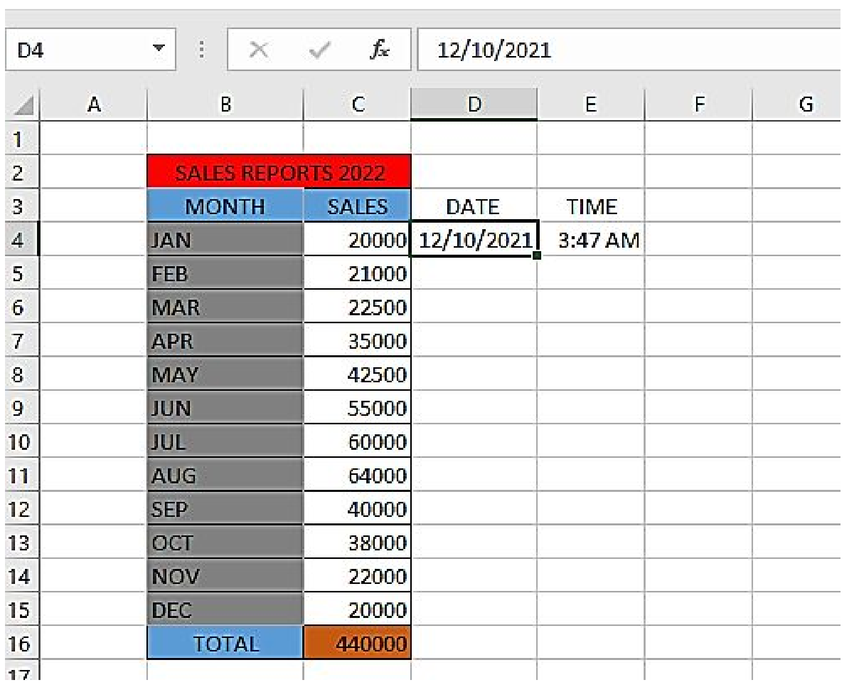
Entering Dates and Times into your Worksheets

According to what you want to perform, there are numerous methods to add dates in Excel. Do you wish to include today's date in a report or invoice, for example? Perhaps you'd want to put a date in Excel that would regularly refresh and always show the current date and time? Or maybe you'd like to have your worksheet auto-fill weekdays or enter random dates? Let's show you how you can do that.

Entering date and time values

Choose the cell. Then, press **Control key + Semi-Colon (;).** This will add the current date to that cell. To enter the time, select the cell, then press **Control + Shift + Semi-Colon (;)** on your keyboard. This will add the current time on that cell.

You can also enter date and time using some functions. To do this, simply Activate the cell you want to add a date on, type in this function on the cell **=TODAY()** and then press **Enter**. For the time, select the cell, type in this function **=NOW(),** and press **Enter**.

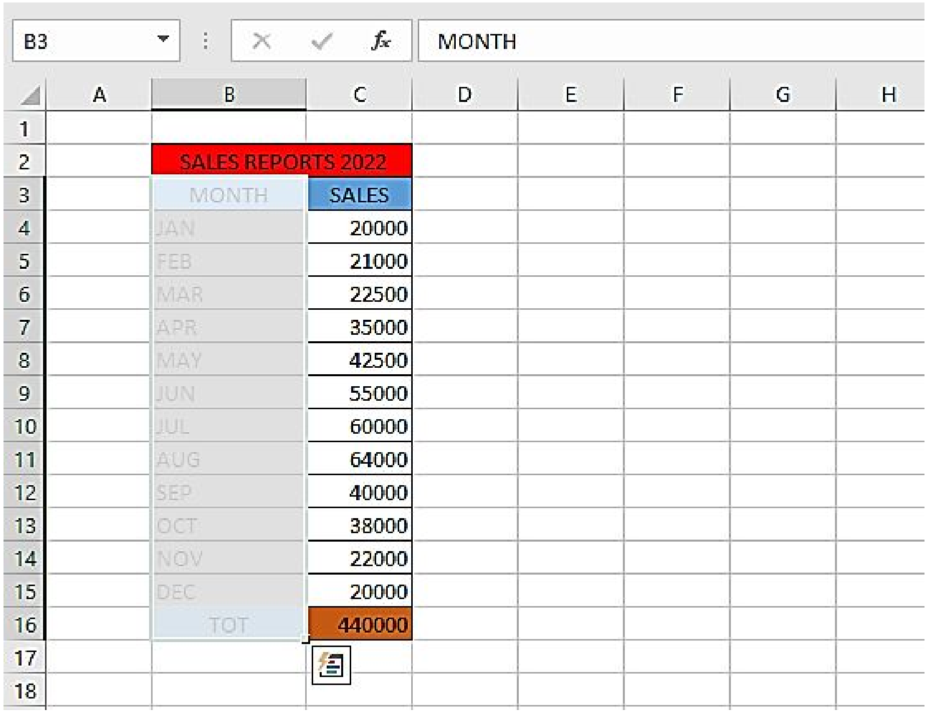


MODIFYING CELL CONTENTS

Deleting the contents of a cell

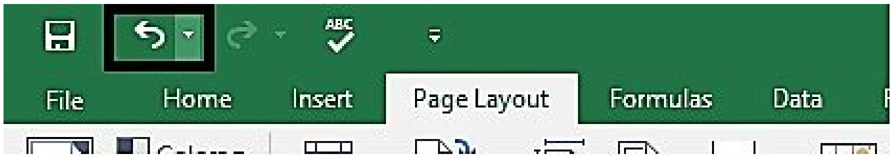
There are various techniques for deleting data on a worksheet. This is a useful command if you accidentally delete data from your worksheet. The instructions below show you how to erase data from a cell or a range of cells

- Click on any cell you want to delete. Then, on your keyboard, press the Delete key. This will delete the contents of the cell.
- Select cell **B3** to **B16** by highlighting it. To do this, place the mouse cursor over B3, click and drag down to B16. Then, on the Fill handle of B16, click and drag it up to cell B3, then leave the mouse button. All contents of B3 to B16 will be deleted.



Replacing the contents of a cell

To replace the contents, you can use the Undo button on the Quick Access Toolbar. Click on it and the contents will be back. You can also press the Control key + Z to do this.



Learning some handy data-entry techniques

The core of Excel is data input. If you can't rapidly and properly input data into your spreadsheets, you won't be able to utilize the tools to analyze and report on the data. When it comes to data input, Excel gets a lot of things right, yet certain things aren't straightforward. Even the most seasoned Excel users may sometimes choose more sophisticated procedures than are required. See below.

- If you wish to remain in the same cell but switch to a new line when entering long text, you can't merely hit [Enter]. This just advances you to another cell. Instead, use [**Alt**] + [**Enter**] to make a line break or a new line in the same cell. This technique is often known as a new line or line break.

- Do you use product codes or other ids that start with one or more zeros in your entries? When you input data like this, Excel thinks it's numbered and removes the beginning zeros. Format your worksheet cells as text rather than numbers to persuade Excel to allow you to input values with leading zeros. There are two techniques to consider:

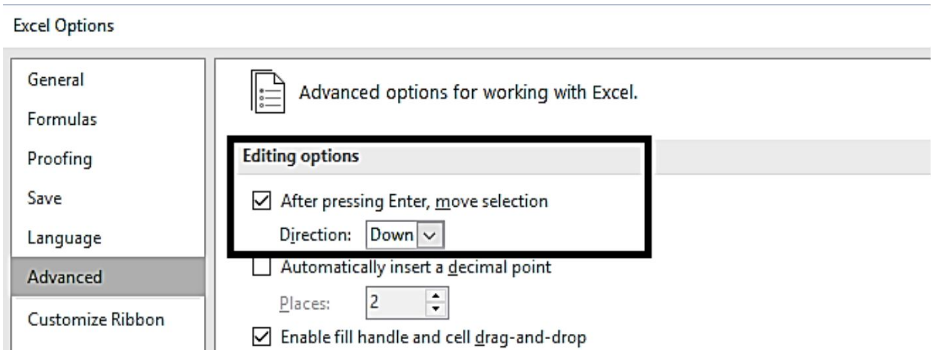
1. One: Type an apostrophe (') in front of each item to convert it to a text format. However, if you have a lot of data, this is a time-consuming method since you'll have to add the apostrophe to each record, not just the ones with leading zeros. Your list will not order appropriately if this is not done.

2. Format selected cells into the text to prepare for data input. Choose the cells (or a whole column) where numbers will be kept as text. Right-click, then select Format Cells, then in the Category box, select Number Click Text and then OK to apply.

Automatically moving the selection after entering data

As you hit Enter, Excel slides the pointer down to another cell. That isn't always the best course of action. It's aggravating when you're typing data from one column to another. You may now hit the right arrow key instead of hitting **Enter**, however, this will cause you to slow down. Although pressing Tab is simpler than extending for the right arrow key, changing the cursor movement as follows may be the simplest solution

Click on **File**. Click on **Options**. This will open up the Excel option menu. On the left-hand side of the menu, click on Advanced. On the **Editing option**, below the **After Pressing Enter** option, select the direction you want from the down arrow. The direction options are Right, Left, Up, and Down. When you are done, click **OK**.



Selecting a range of input cells before entering data

In Excel, working with a whole data set is a regular activity. You could wish to transfer the data, apply a filter or a standard format, or convert it to a table. There are several reasons to pick a data range, but doing so may need to leap through a few selection hoops, particularly if you're dealing with a wide range that covers multiple screens. Fortunately, selecting a whole data range is simple and fast.

Use the **Go To** function to choose a data range as follows:

Any cell in the data range may be selected by clicking it. For example, you might choose any cell from B2 through C15 to choose the data range B2:C15.

[**F5**] is the shortcut key. Press it.

Click the Special button in the bottom-left corner of the **Go To** dialog.

Select Current Region from the pop-up menu that appears.

When you click **OK**, Excel will choose the current data range for you (the current region).

Using CTRL + Enter to place information into multiple cells

In Excel, copying and pasting a single cell is simple. When it comes to copying and pasting a group of cells, columns, or rows, you have several options. Use the shortcut **Control key + Enter key** to activate. Pick a few cells and type any term or value into any of them. Instead of hitting Enter, hold down the Control key and hit Enter. You'll see that the name is copied to all of the chosen cells.

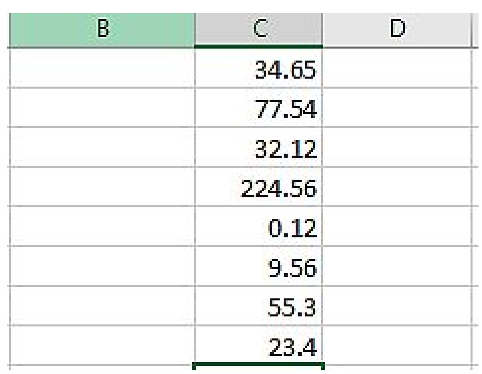
Changing modes

In an Excel spreadsheet, there are four different sorts of cell editing modes. "**Ready**," "**Edit**," "**Enter**," and "**Point**" are the four sorts of Cell modes. An Excel cell's default mode is "Ready." Excel is ready to take data in any of its worksheet Cells while it is in Ready mode.

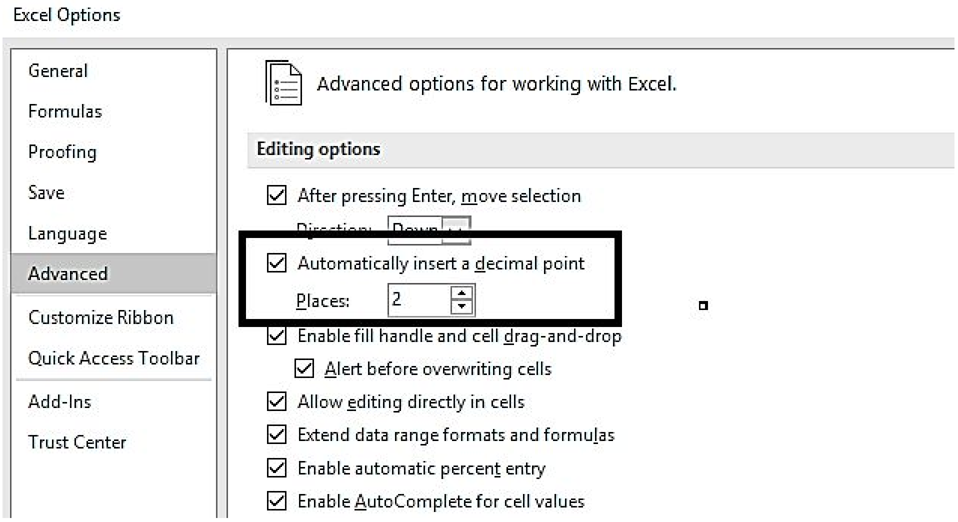
The default "**Ready**" mode of its Active Cell is changed to "**Edit**" mode by pressing the function key "**F2**" once. If you hit the function key "**F2**" again when in "**Edit**" mode, the Cell mode will change to "**Enter**." The fourth cell mode is called "**Point**." While creating or editing a formula, "**Point**" cell mode enables you to explore a large Excel spreadsheet and choose the required cells.

Entering decimal points automatically

If you need to input many numbers, each of which includes two decimal numbers, as illustrated below, manually typing the decimal point will be a waste of time. Now I'll show you how to quickly add a decimal point to a number in Excel at a precise location.



To do this, click on **File** > **Options**. In the Options menu, select **Advanced**. Under the Editing Option, check the box close to the **Automatically insert a decimal point** option. Then, put in the decimal places in the Places option.

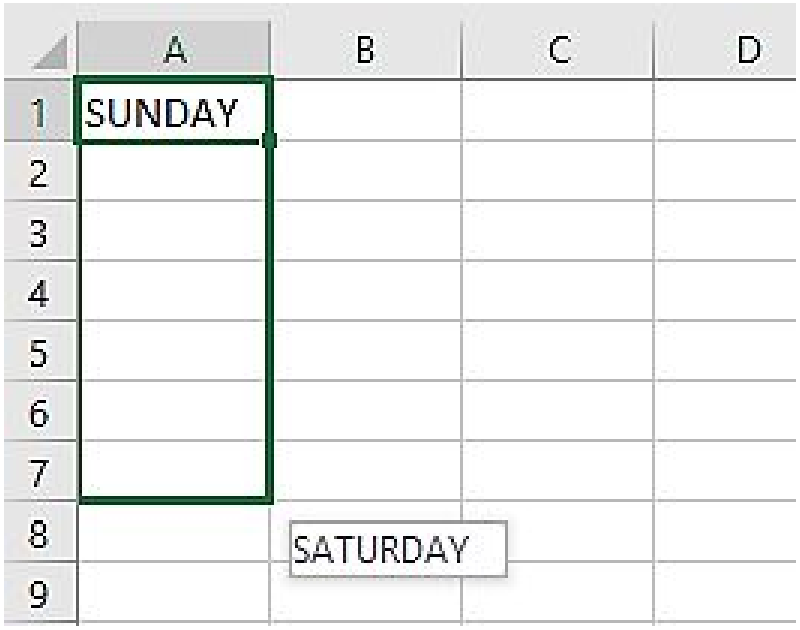


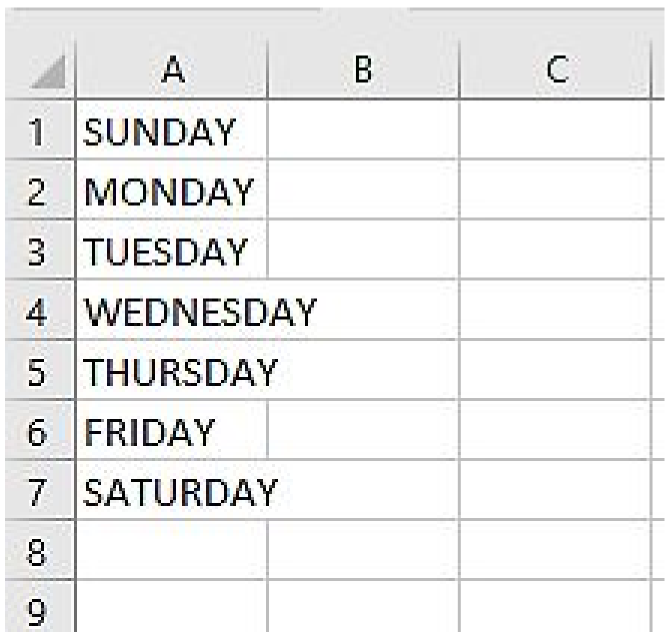
After that, click **Ok**.

Using Autofill to enter a series of values

You may use the AutoFill command to automatically lengthen a predictable sequence (for example, 10,20,30.... day, hours of the day). You may also use AutoFill to propagate formulae - create the formula once, then use AutoFill to spread it to the other cells.

So, select a cell and type the first day of the week; Sunday. Activate the cell you typed in the day. Then, hover the cursor to the little box beside the cell. When the pointer changes to an **Add sign (+),** click and drag down. Excel will fill in the rest of the values i.e., the days of the week.



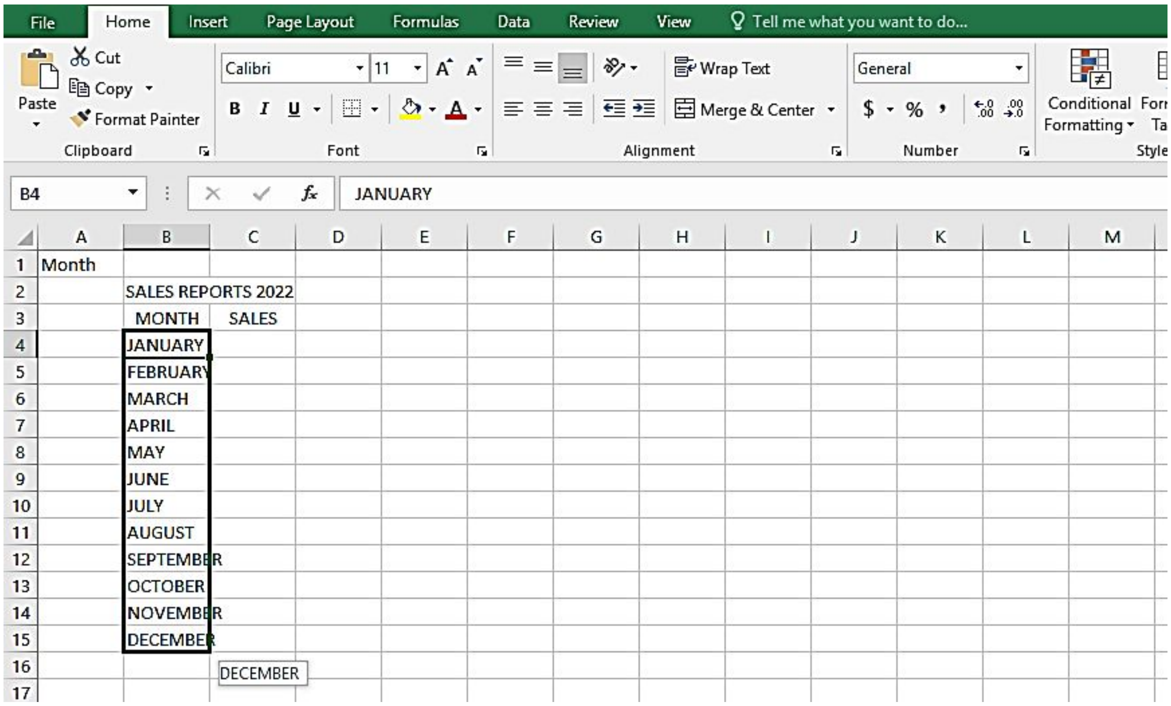


Using Autocomplete to automate data entry

When manually inputting data into a spreadsheet, the AutoFill option comes in handy. This function is useful for a variety of things, but it's especially useful for inputting data in a certain order, such as the digits 2, 4, 6, 8, and so on, or non-numeric data like the days of the week or months of the year. Just like we did in chapter one when we completed the months of the year by dragging down the box beside the month cell. See the example below;

Activate **Cell B4** and type in January. Then, you will see a tiny small box beside the cell which is the Fill Handle.

Click on it and drag down to 11 rows on the bottom right of Cell B4 (**B15**). Because Excel identified January, it will automatically fill the remainder of the months for you rather than making you input them.



Forcing text to appear on a new line within a cell

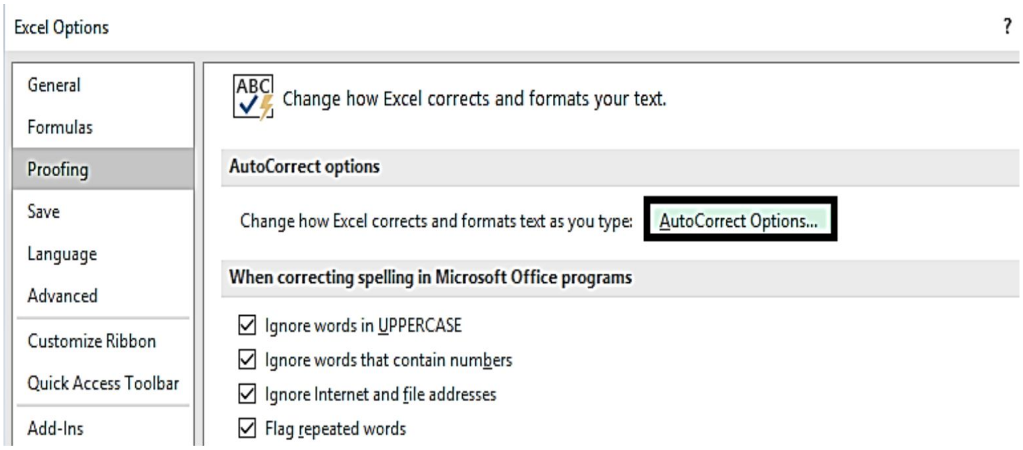
By pressing the **Alt key + Enter**, you can insert a line break or start a new line of text or create space between lines and paragraphs. On the cell you want the line break to appear, double-click on it. to break the line, click the desired position inside the cell you have chosen.

Using Autocorrect for shortcut data entry

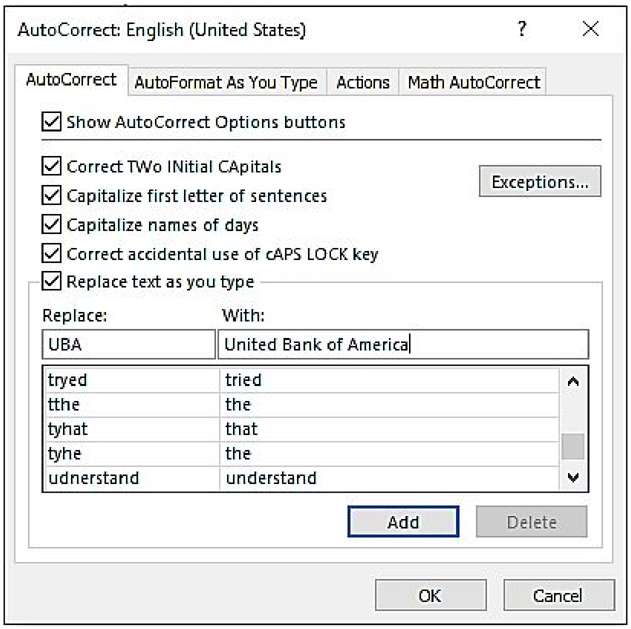
Excel's AutoCorrect tool may be used to create shortcuts for frequently used words or phrases. Entering lengthy stuff or individual name takes time and often results in mistakes and inaccuracies. To fix this problem, use the AutoCorrect tool to create shortcuts and modify them. Follow these procedures below;

Click on **File** > **Options**. This will open up the **Excel Options** menu.

On the left-hand side of the menu, select **Proofing**. Then, click on **AutoCorrect Options.**



This will open up the AutoCorrect option dialog box. On the Replace text box, type in the shortcuts you want and what you want to replace them with. Then, click **Add**. As you can see in the image below.



You must give each AutoCorrect item a distinct name after entering or choosing it.

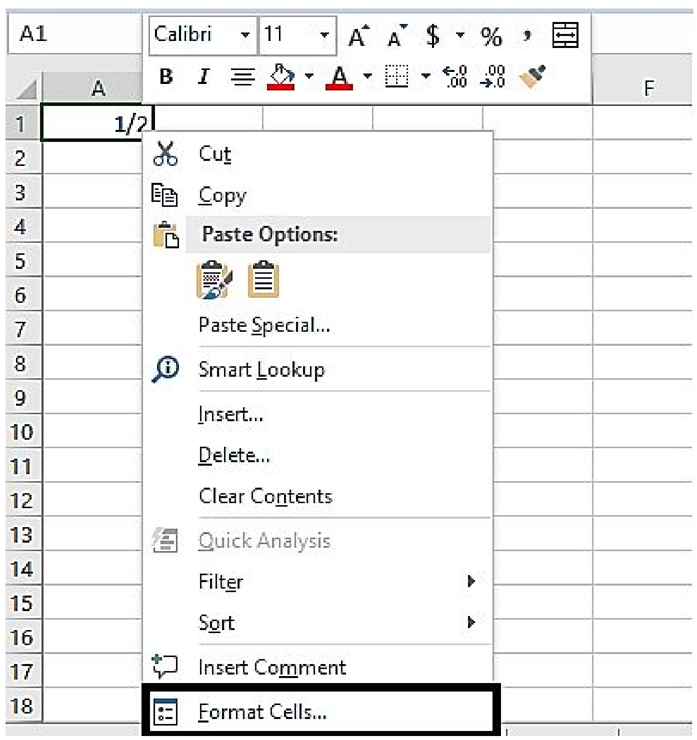
If you're going to name an AutoCorrect entry, don't use a popular term unless you're going to change it.

Don't call an entry Mr., for example. Instead, use an underscore or another symbol to distinguish it, such as *Mr. If you don't make the term unique, Word will automatically insert the AutoCorrect entry anytime you enter it, whether you want it or not. If you've picked a frequent term, reverting each auto-correction will take too much time.

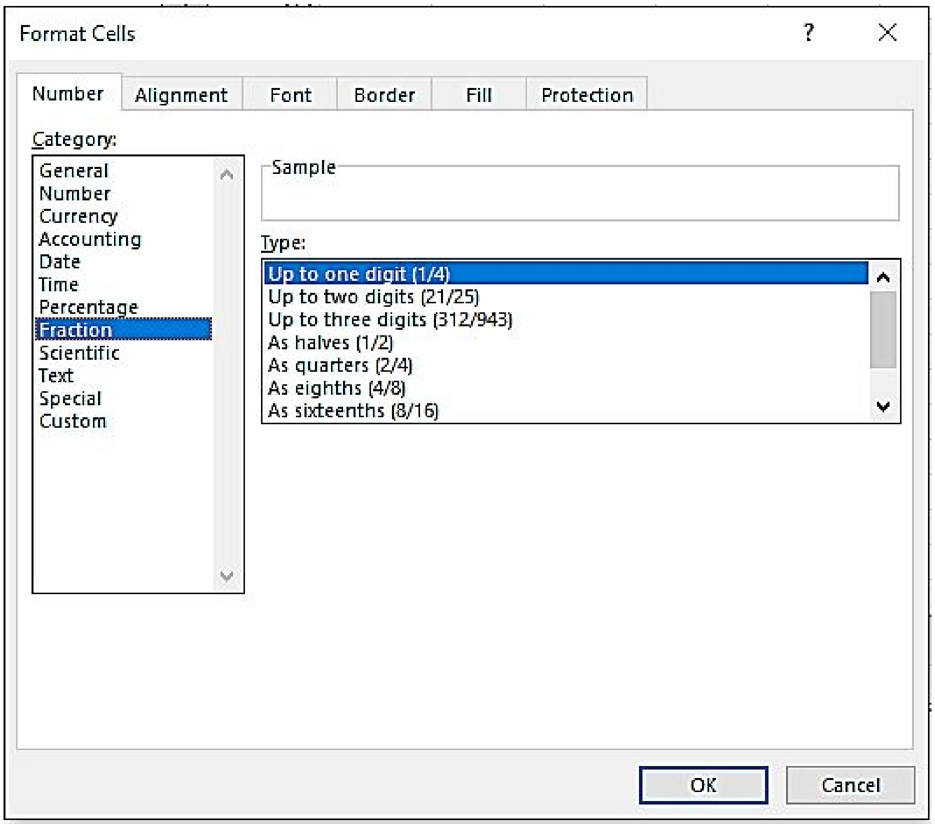
Note that your AutoCorrect list in Excel is shared with other Office products. Any AutoCorrect entries you make in Word will function in Excel and Outlook as well.

Entering numbers with fractions

When we use the slash **("/")** symbol to separate two integers in Excel, the values are converted to decimal format. We may use the Fractions option to retain fractions for such values; first, choose the cell whose value we want to convert fractional and then choose the Format Cells option from the right-click menu list.



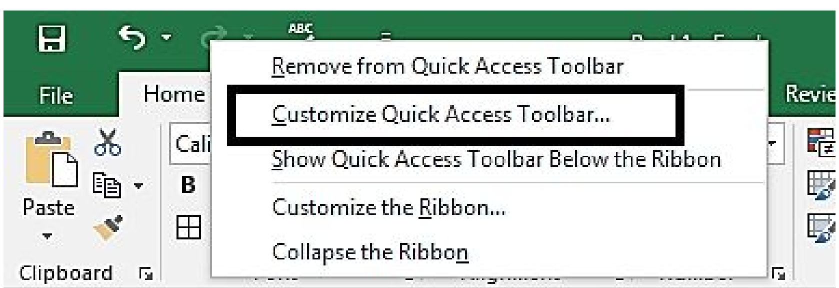
Click on the **Number tab**, pick **Fraction** from the category area, where we have many criteria for fractioning up to one digit, two digits, or three digits like halves, eighths, etc. Then select the **Fraction Type** you want.



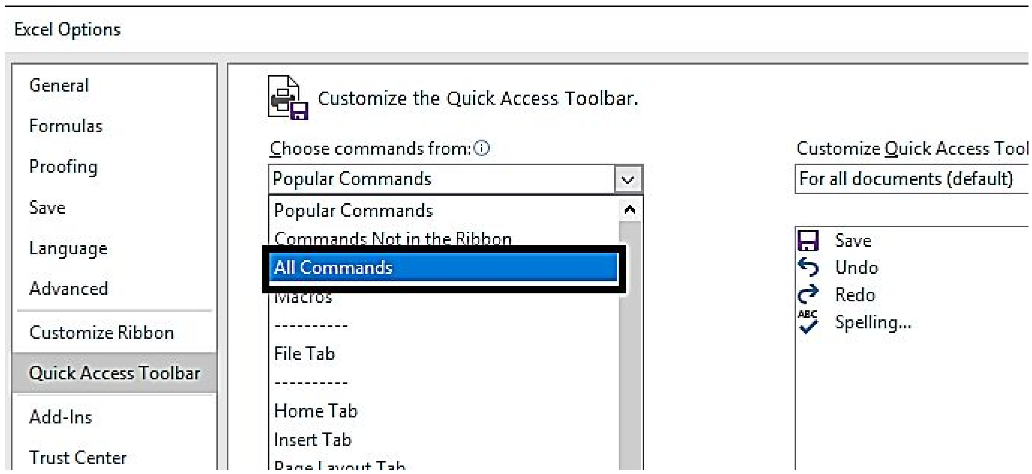
Using a form for data entry

A data entry form can assist by data entry process more efficient and error-free. You use it to put data into your worksheet. By default, there is no data entry form option on the Excel Ribbon. So, you will have to add it to the Quick Access Toolbar so you can access it easily. Follow the steps below to add it;

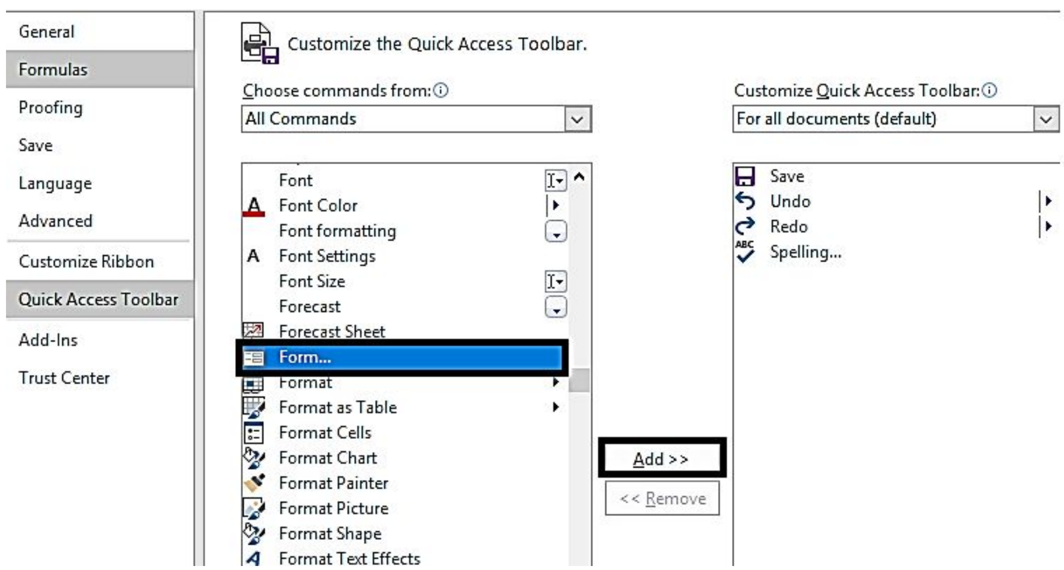
Right-click on any option on the **Quick Access Toolbar** and select **Customize Quick Access Toolbar.**



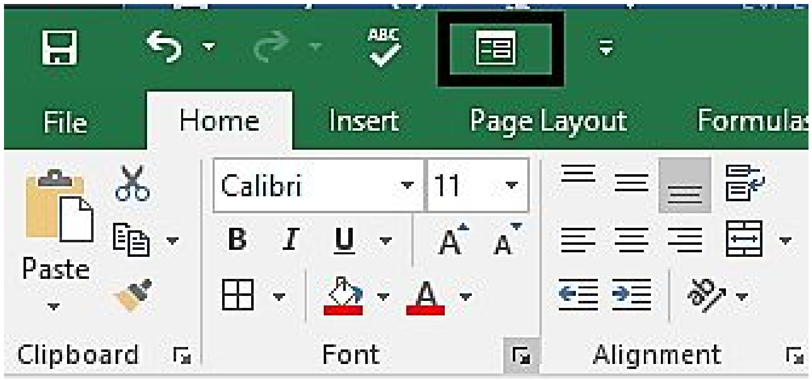
This will open up the Excel Options box. Click on the drop-down arrow on the Choose commands from and select All Commands.



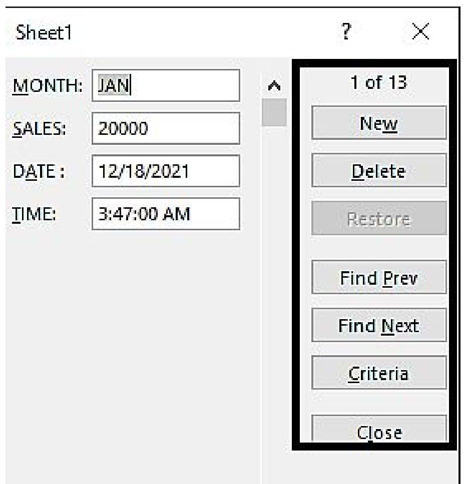
On the All command list, click on Form, then click on the Add button. Then, OK.



You will see the Form Icon on the Quick Access Toolbar. So, you can easily access it now. Simply click on the cell you want to input data from, then click the Form-Icon.



The Data Entry Form is made up of different options. Below is a brief explanation of what each option does.

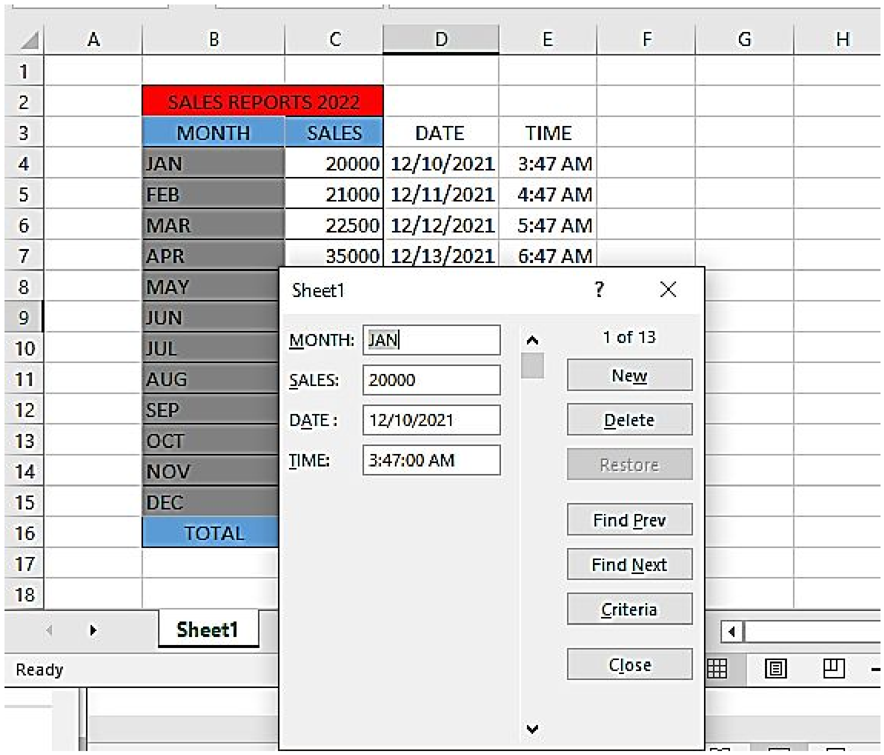


- **New**: This clears any existing data in the form and enables you to start over with a new record.
- **Delete**: You may use this to get rid of an existing record.
- **Restore**: If you're updating an existing entry and haven't clicked New or pressed Enter, you may restore the old data in the form.
- **Find Previous**: This will locate the preceding entry.
- **Find Next:** This will take you to the next page.
- **Criteria**: You may use criteria to discover particular records.
- **Close**: This will bring the form to a close.
- **Scroll Bar**: The scroll bar may be used to navigate through the records.

Let's take a look at all you can accomplish with an Excel Data Entry form.

- Activate the cell for the data.

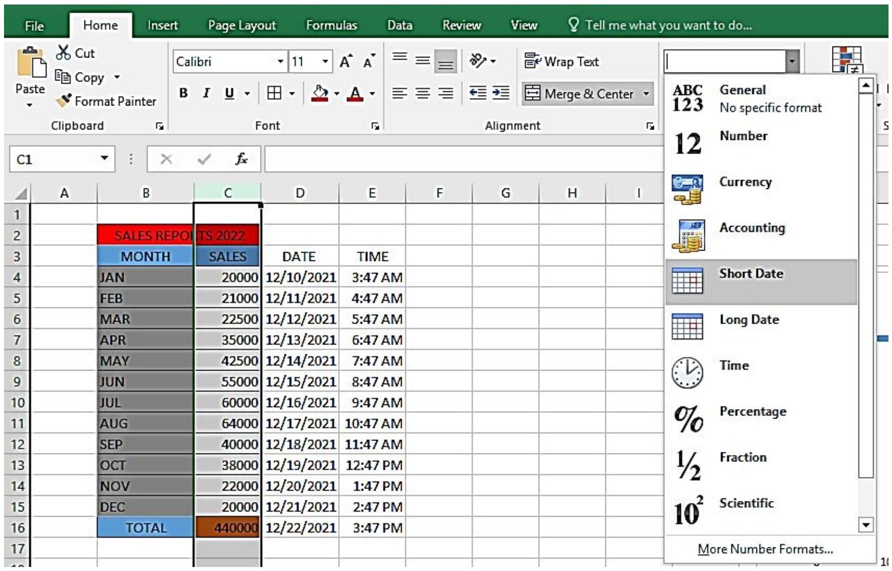
- Click on the Form-Icon. This will open the data form box. Now type in the data in the fields. Then, press the Enter key. You can also click the New button.

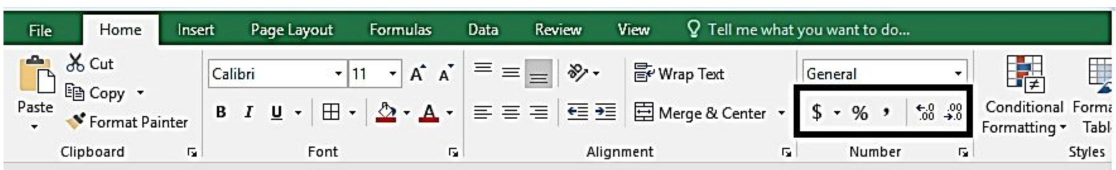


Applying Number Formatting

It's a wise concept to utilize suitable number formats for your data if you're dealing with a spreadsheet. Number formats specify what sort of data you're utilizing in your spreadsheet, such as percentages (%), money ($), times, dates, etc. Number formats not only make it simpler to read your spreadsheet, but they also make it easier to utilize.

To apply a number format, choose the cell > On the Number group, click on the arrow and select a number format. Click on More Number Formats for more formatting options.

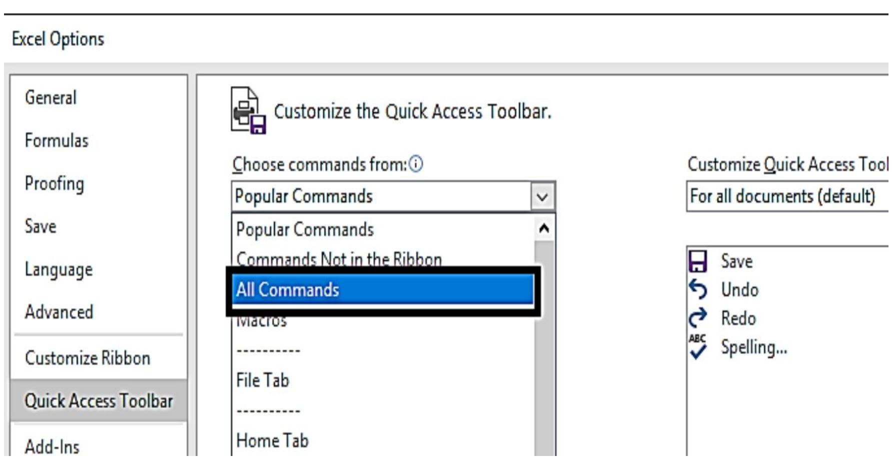




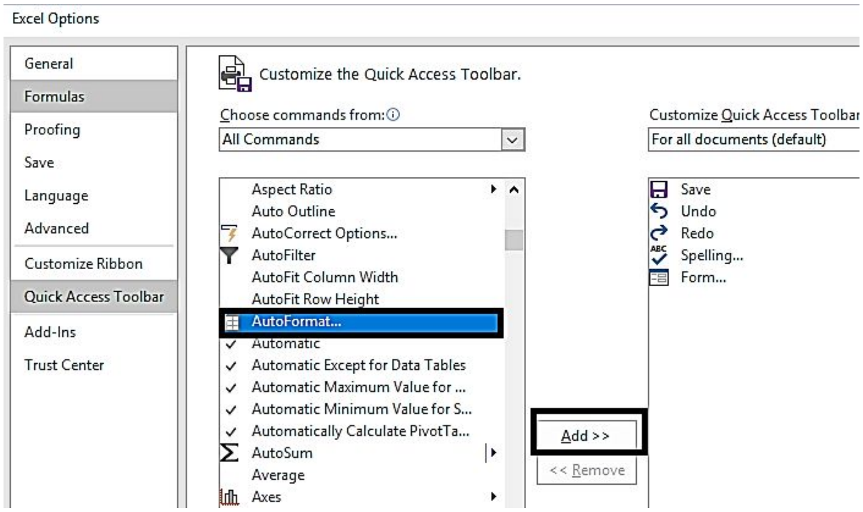
Using automatic number formatting

The AutoFormat option cannot be accessed from the ribbon, so you will have to add it to the Quick Access Toolbar. Right-click on the Quick Access Toolbar and select **Customize Quick Access Toolbar.**

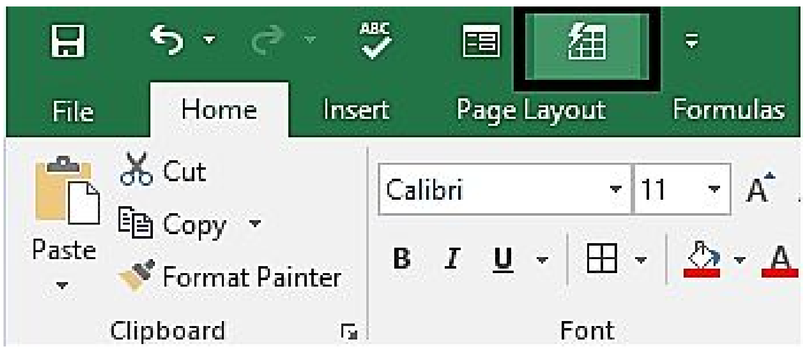
Click on the down arrow on the Choose commands from and select **All Commands**.



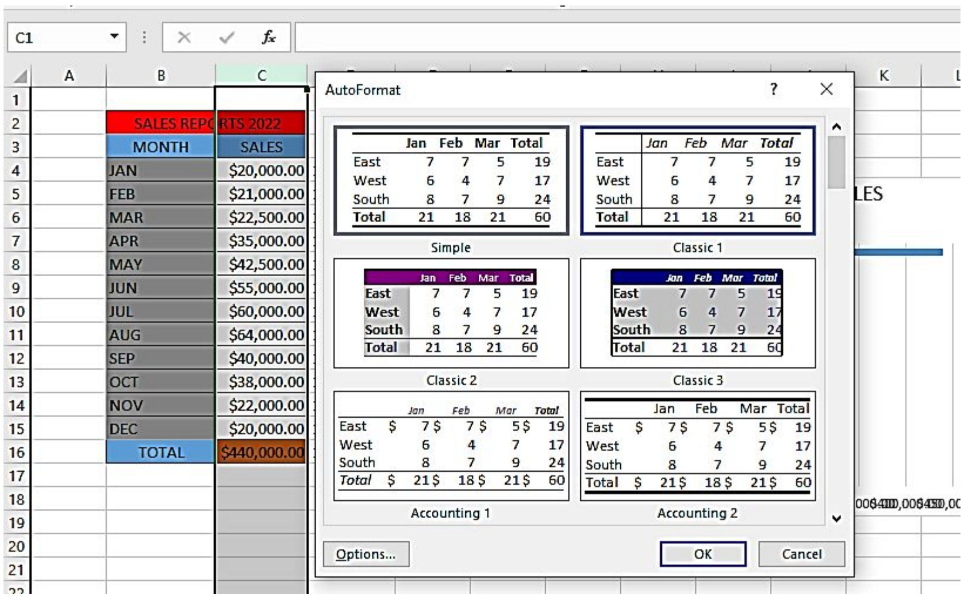
On the All Commands list, click on AutoFormat, then click Add. This will add the AutoFormat Option on the Quick Access Toolbar.



This will add the AutoFormat Option on the Quick Access Toolbar.



To AutoFormat the numbers, simply highlight the whole data, hit the AutoFormat icon. This will display the AutoFormat menu. Choose any style, then click **Ok**.



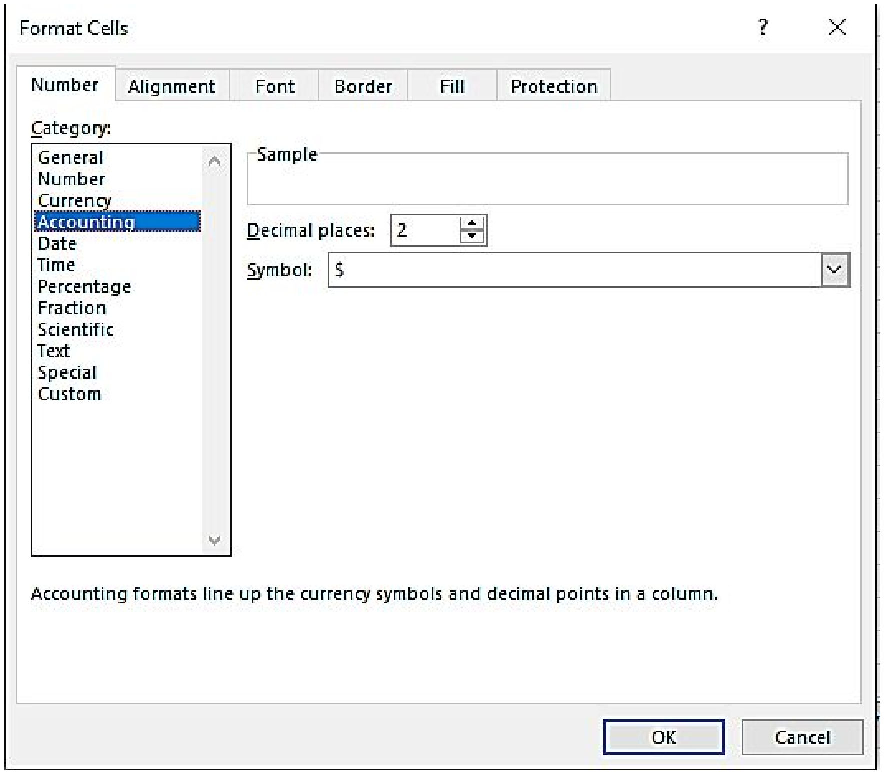
Using shortcut keys to format numbers

There are shortcuts for formatting numbers on Excel. **Control key + Shift key + Number key**. Simply choose the cell(s), then press the shortcut keys. Below is a list of the shortcut keys and their function.

Control + Shift + ` = **General**	Control + Shift + 5 = **Percentage**
Control + Shift + 1 = **Number**	Control + Shift + 6 = **Scientific**
Control + Shift + 2 = **Time**	Control + Shift + 7 = **Border**
Control + Shift + 3 = **Date**	

Formatting numbers by using the Format Cells dialog box

Pick the cell for formatting, right-click on it and select **Format Cells**. On the Dialog box, you will see a list of options that you can select from. Choose the one you want and click **OK**.

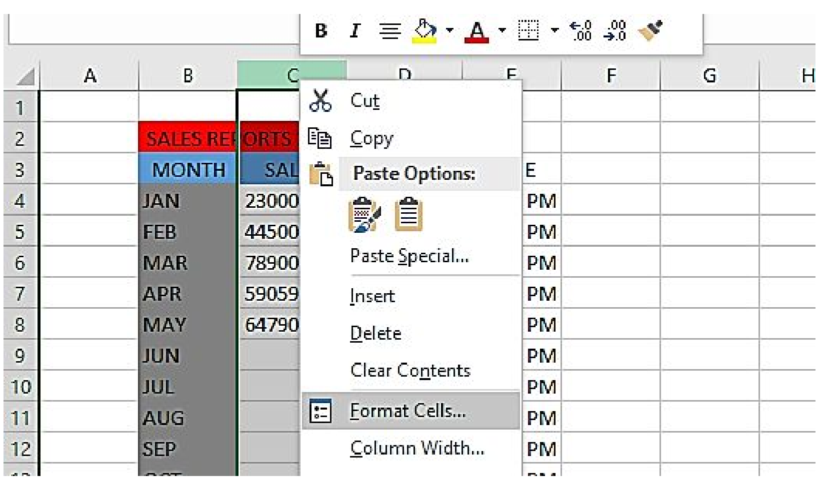


Add your own custom number formats.

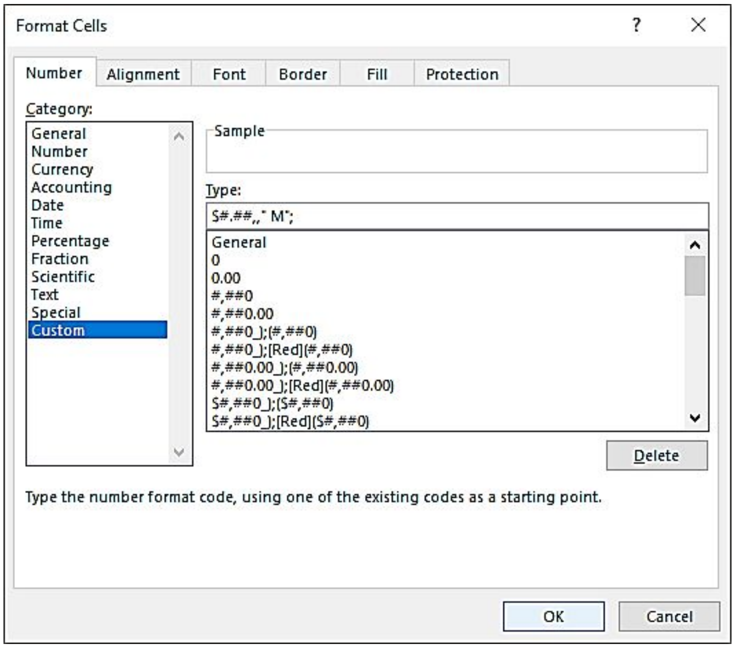
You may wish to format a number in a custom manner, such as formatting 421020000 as $421.02 M, and then store this for future use. You can also apply it to multiple cells.

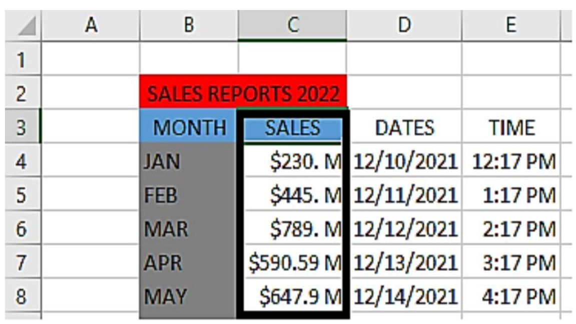
To do this, follow the steps below.

Select the cell that has a number value in it, right-click on it, then click on **Format Cells**.



Click on the Number tab, then click on Custom. On the box below the Type option, type in the format code $#.##,," M"; then, click **OK**.





CHAPTER THREE

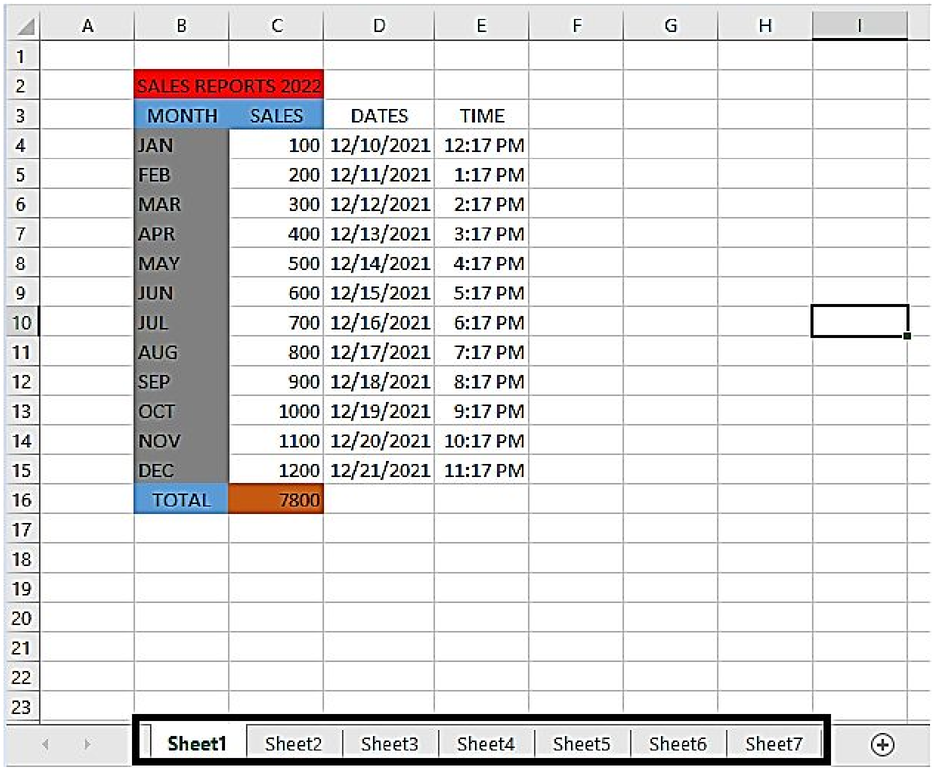
PERFORMING BASIC WORKSHEET OPERATIONS

Worksheets may be a fantastic tool for organizing your data. Rather than jamming everything into one worksheet, the user may utilize several worksheets inside a workbook.

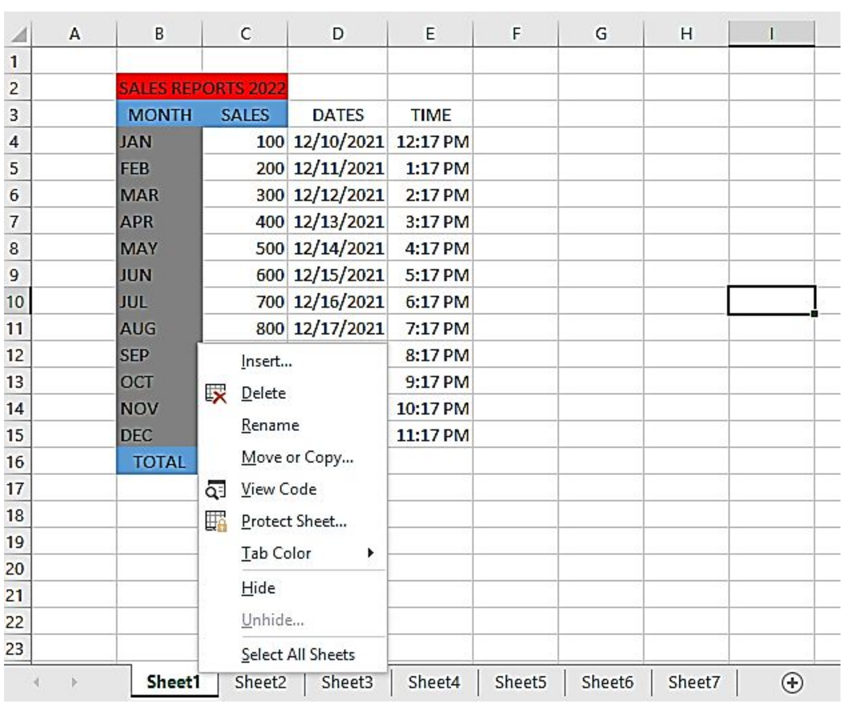
Learning the Fundamentals of Excel Worksheet

Each file in Excel is referred to as a workbook, and each workbook may include more than one worksheet. Consider an Excel workbook as a notebook, with worksheets serving as pages inside the notebook. You may see a specific sheet, add new sheets, delete sheets, and copy sheets just like in a notepad.

Excel workbook files can contain more than one-sheets. These sheets can be different from each other. It can be chart sheets (containing a chart) or worksheets (which contain rows and columns). Take note that each worksheet has a unique name; by default, a workbook opens with three worksheets named Sheet1, Sheet2, and Sheet3. However, you may add, remove, and rename these spreadsheets as desired.



Right-clicking on a worksheet brings up a menu containing some options for making changes to your worksheet. You will see options like **Insert, Move or Copy, Rename, Delete**, and others. You can also change the color of the worksheet.



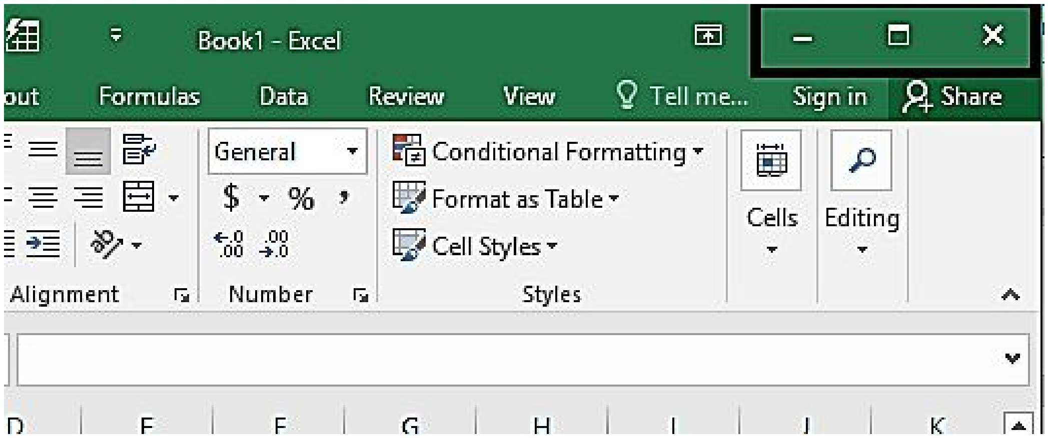
Working with Excel windows

A window is opened for each Excel workbook file that you open. A window is the workbook's container in the operating system. You may open as many Excel spreadsheets as you want concurrently. As with other Windows programs, the Excel window's control buttons are situated in the window's extreme right top corner.

Three window-control buttons are accessible. To minimize the Excel application window, press the left button. The middle button maximizes/restores the Excel software window. To dismiss the Excel application window, click the right button.

The functionalities of the left and right buttons are always identical. They are used to minimize and close the Excel software window. However, the center button's operation is dependent on the present state of the Excel window. If the current state of the Excel window is Maximized, the center button is used to Restore the Excel window to its default state. When the current state of the Excel window is Restored, the center button is utilized to maximize the Excel window. You must comprehend three concepts relating to window state: minimized, maximized, and restored.

- **Minimized state**: A minimized Excel window is not visible on the Operating System screen but is minimized to stay on the Windows taskbar.
- **Maximized state**: The term "maximized Excel window" refers to the state of the Excel window when it has been maximized to fill the whole screen of your Operating System.
- **Restored state**: When an Excel window is restored to its original size, it is said to be restored to its restored condition. When the window state is restored, the size of the Excel window is less than when it is maximized. You may resize the Excel window in this state.



Moving and Resizing Windows

When the Excel window is in the Restored state, drag the Windows pointer to one of the window's sides or corners. As seen here, the Windows cursor transforms into a **double-headed arrow.** Once you see the arrow, click and drag the mouse. The window will begin to resize. Note that when you drag the window, the resizing will affect the height and the width.

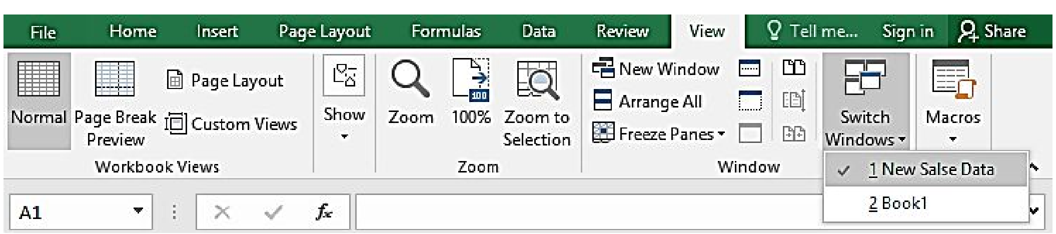
To move a window

When the Excel window is in a Restored state, move your mouse pointer to the top of the Excel title bar. Then, click and drag the window to any location on the screen you want.

Switching Windows

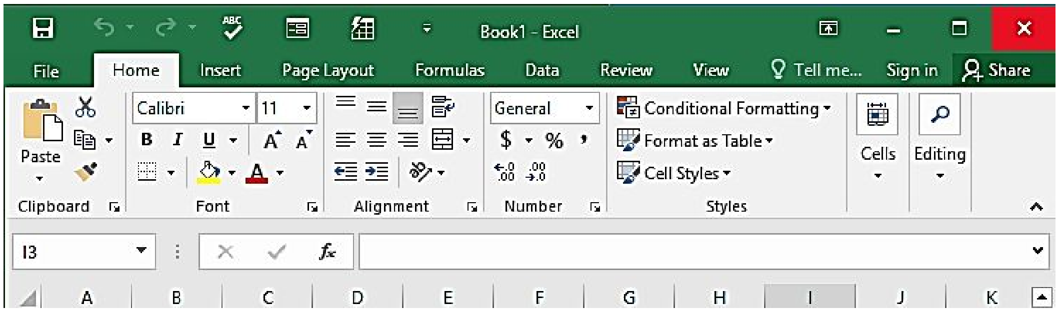
You must have at least two Excel workbooks open to switching windows. Click on the View Tab, click on Switch Windows.

Choose the window to switch to.



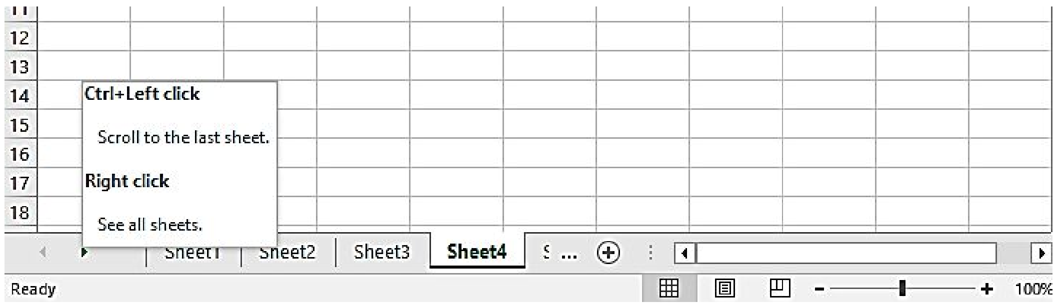
Closing Windows

On the top right-hand side of the Excel window, click on the close button.

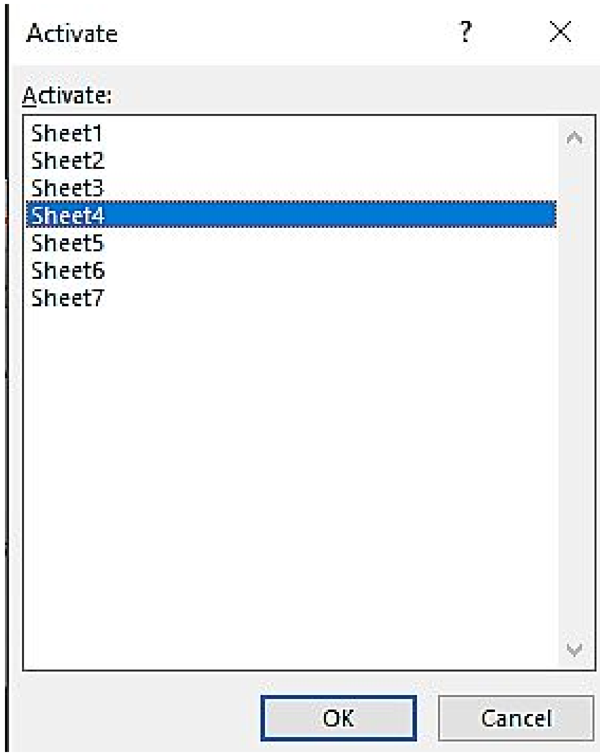


Activating a worksheet

To activate a worksheet, click on the small left arrow at the bottom left of the workbook.

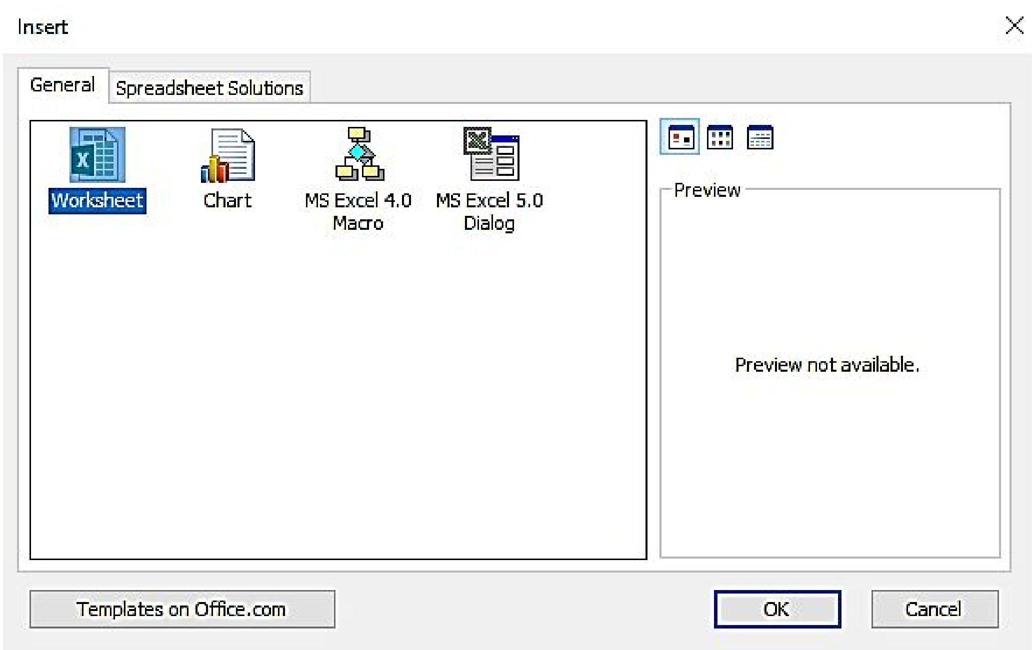


Then, right-click to see all sheets. This will bring up the Activate Sheet menu. Click on the sheet you want to activate and then click Ok.



Adding a new worksheet to your workbook

You can do this in two ways. First, click the **(+)** sign below the workbook to add the workbook. You can also right-click on the present worksheet below the menu which should be **Sheet 1**, then click on Insert, click worksheet and then click **OK.**



Deleting a worksheet

To do this, simply right-click on the name of the sheet you want to delete, then select **Delete**.

Changing the name of a worksheet

Select the name of the sheet you want to rename by right-clicking on it. when you do so, select Rename. Then, you can now rename the sheet by typing the name on the sheet box.

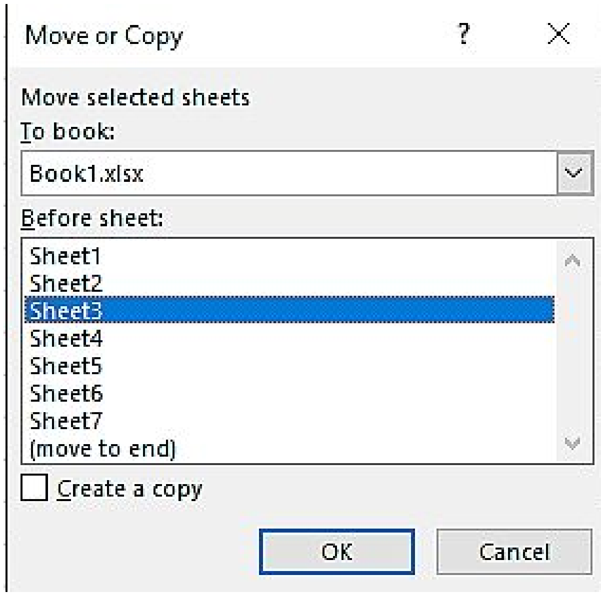
Changing the tab color

On the sheet, you want to change the tab color, right-click on it. from the list of options there, click on Tab Colour. Then select the color you want to use.

Rearranging your worksheet

You can move or copy a worksheet to another location. Right-click on the worksheet, choose Move or Copy. You can rearrange the worksheet to another position on the same workbook and you can also rearrange the worksheet to another worksheet.

1. To reposition a worksheet inside the same workbook, click the worksheet's name.



2. To reposition a worksheet to a different workbook, choose the new workbook from the "**To Book**" option and click the name of the worksheet you want to move.

Note that your worksheet will vanish from the main workbook when you move it to another workbook.

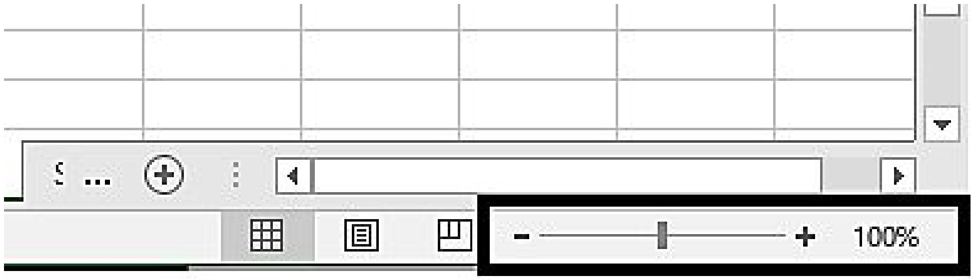
Hiding and unhiding a worksheet

Select the worksheet, right-click on it and select Hide. To unhide it, select any worksheet from the list and right-click on it, then select Unhide.

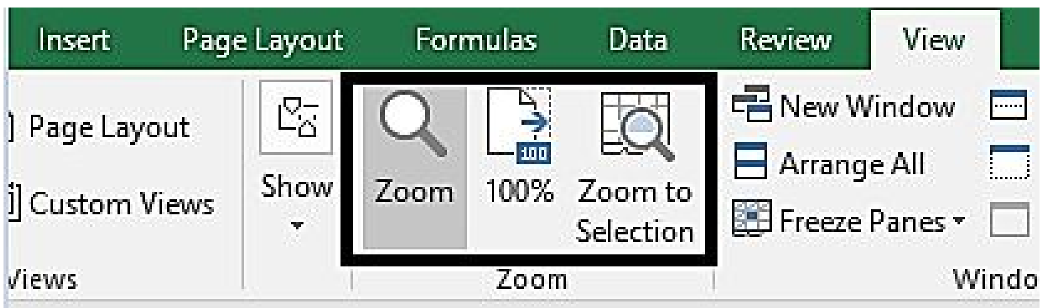
CONTROLLING THE WORKSHEET VIEW

Zooming in or out for a better view

By using the Zoom slider in the Microsoft Excel status bar, you may zoom in or out of an Excel worksheet. The status bar is located in the bottom right corner of Microsoft Excel. Slide to the desired % zoom setting. To zoom in and out in small steps, use the - or + buttons. The percentage number associated with the zoom level is also shown in the status bar adjacent to the zoom slider. When you click the percentage, a Zoom dialog box appears, allowing you to choose from preset zoom levels or create your own.



You can also make use of the ribbon. On the ribbon, click on View. On the View tab, you will see the Zoom box with some options in it.

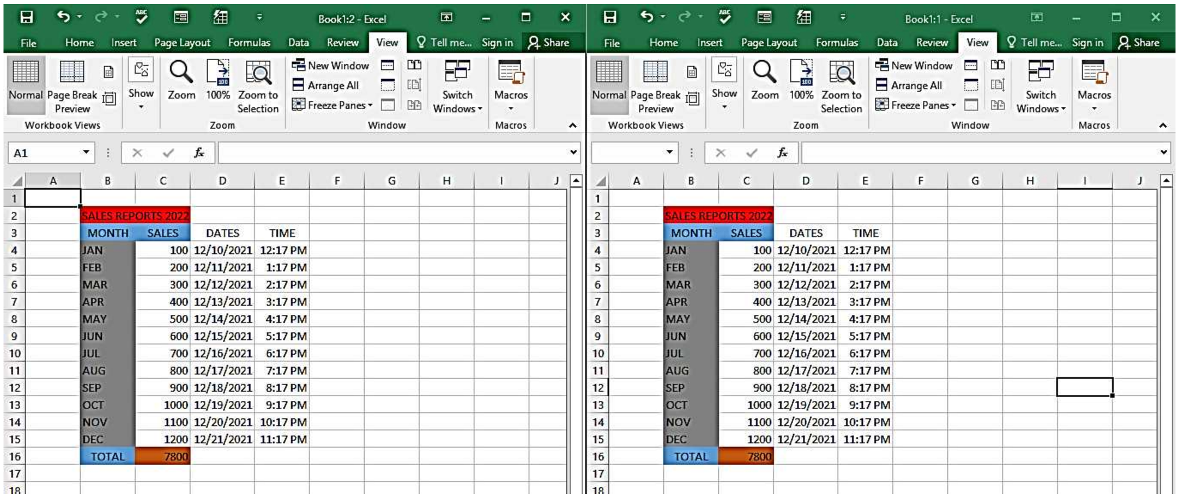


Viewing a worksheet in multiple windows

You need to have more than one window opened. So follow the steps below to do so;

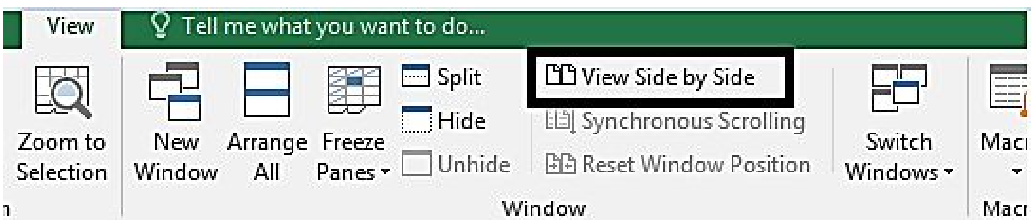
- Click **View** tab.
- From the options there, select **New Window**.
- Click on the **View tab** again and select Arrange All. This will open up a box for you to select how you want to arrange the windows. Once you have selected it, click OK.

The worksheet will now appear on both windows.



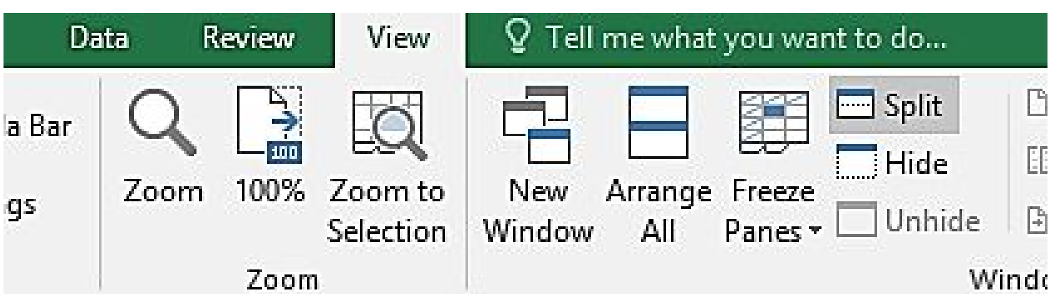
Comparing sheets side by side

To do this, click on the **View tab**, you will see the **View Side by Side option**, click on it.



Splitting the worksheet window into panes

To do this, you will make use of the Split Button on the View tab. So first of all, choose the row or column that you will like to insert the split pane. Then click on View on the ribbon, then click Split.

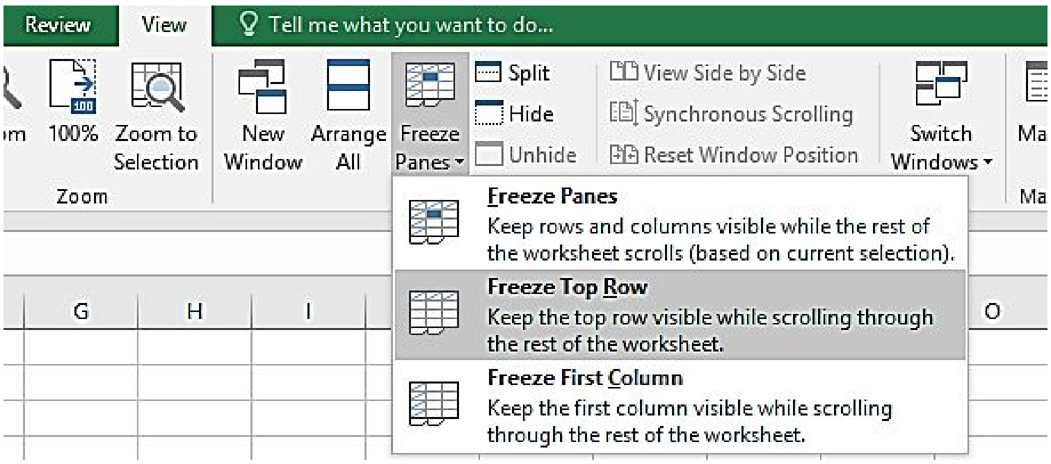


Keeping the titles in view by freezing panes

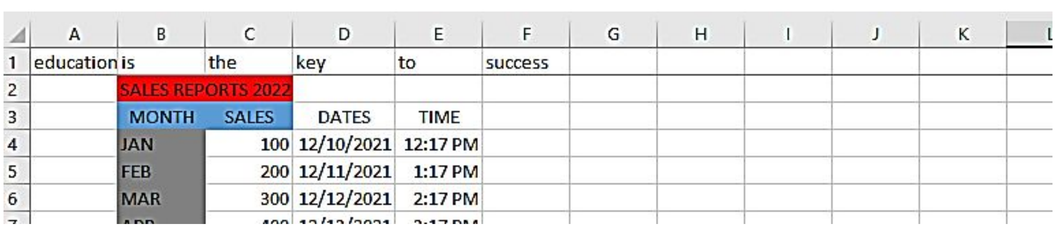
Freezing panes in Microsoft Excel implies that some rows and/or columns will be constantly visible at the top of a worksheet while scrolling. Below are the steps to do so.

Freeze Top Row

- Select **Freeze Panes** on the View tab.
- Select **Freeze Top Row** from the menu.



You will see a dark grey horizontal line on the top row.



Unfreeze the Panes

- Select Freeze Panes from the Window group on the View tab.
- Select **Unfreeze Panes** from the menu.

Freeze First Column

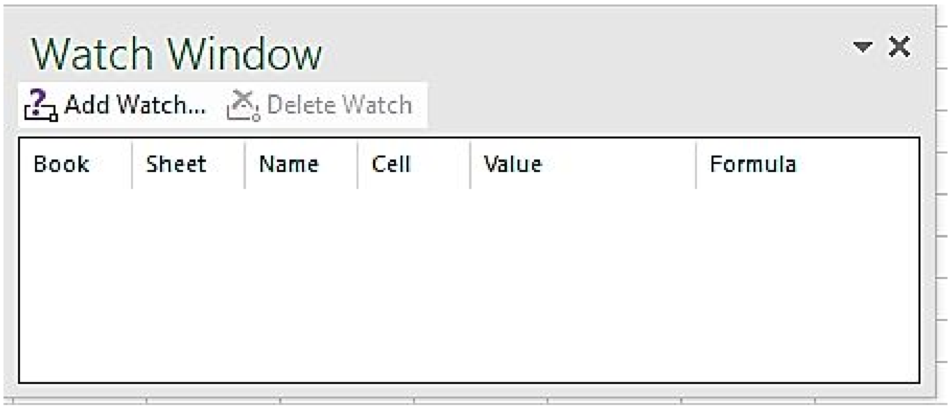
- Select **Freeze Panes** on the View tab.
- Select **Freeze First Column**
- You will see a dark grey vertical line in the first column.

You can do this to the rows and cells as well using the same steps.

Monitoring cells with a watch Window

In Excel 2013, Microsoft added the Watch Window. It's a tool that displays the value of a cell and its characteristics in another window, including the workbook and worksheet titles, cell or range names, cell address, and formulae. This window may be placed anywhere you like and even docked like a toolbar.

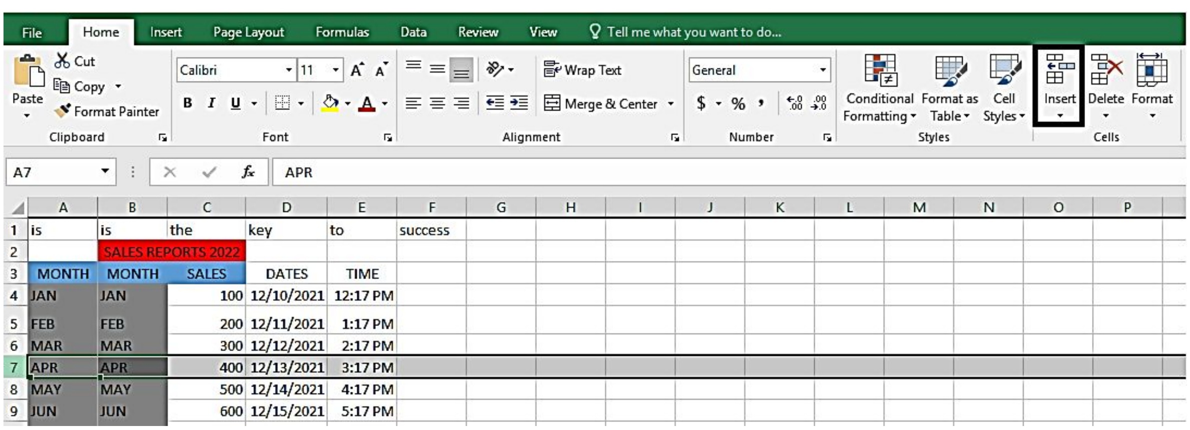
To use the Watch Window tool simply click on Formulas on the ribbon, then click **Watch Window**. This will bring up a box where you can add and remove cells.



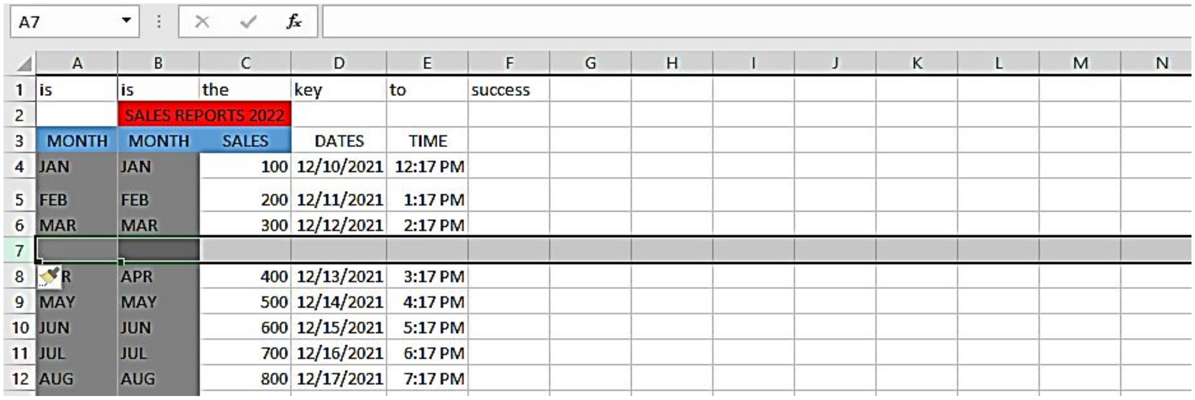
WORKING WITH ROWS AND COLUMNS

Inserting rows

Click on the heading of the row where you want to insert the new row. Then, on the home tab in the ribbon, click Insert.

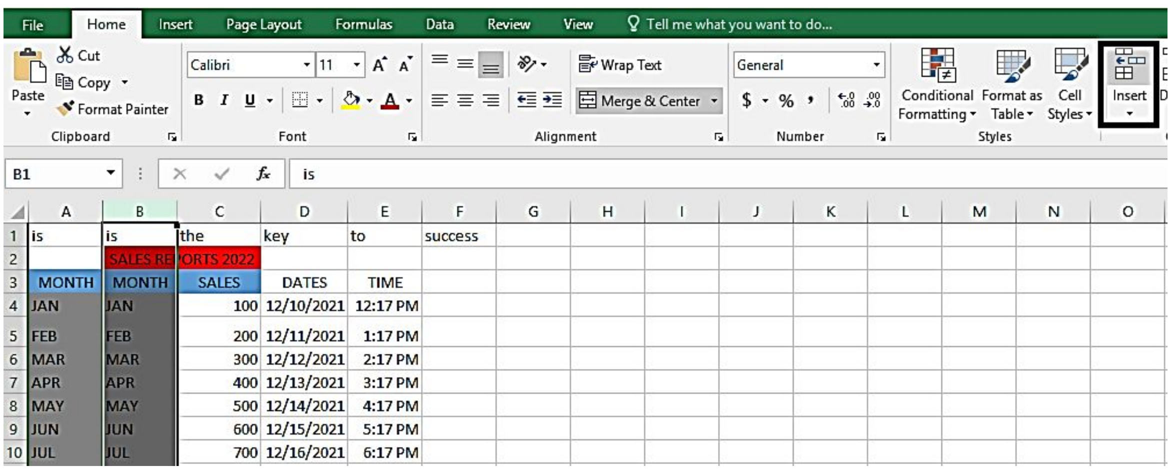


The newly inserted row will appear on top of the row you selected.

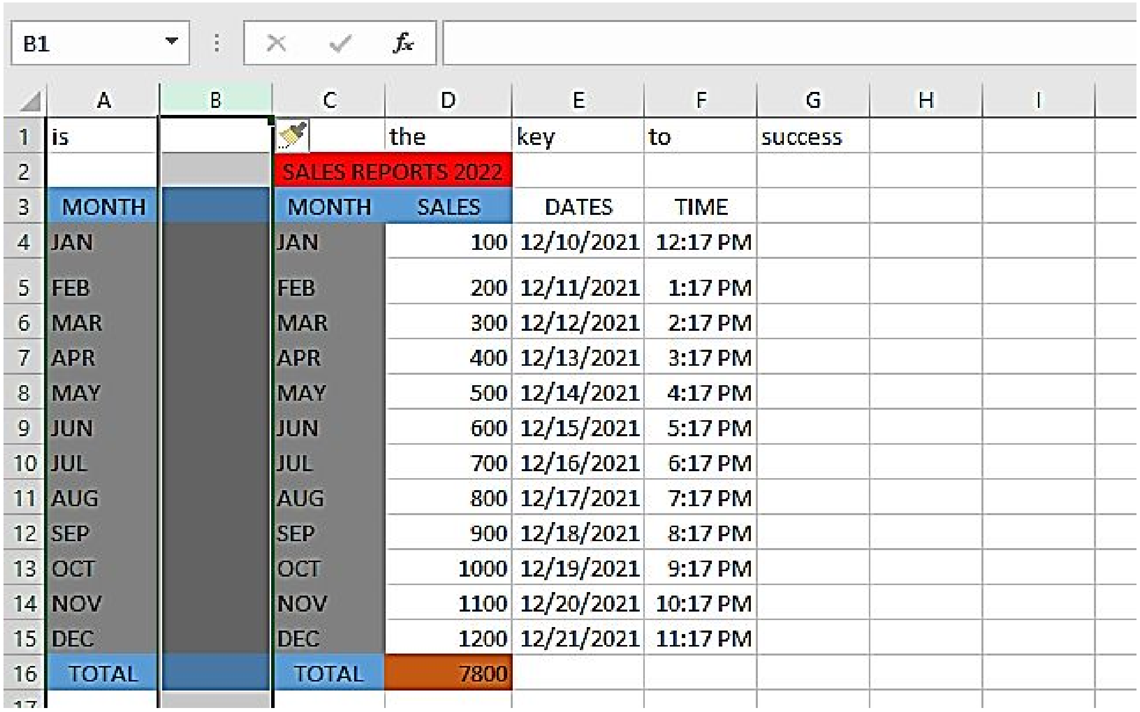


Inserting Column

Click on the heading of the column where you want to insert the new column. Then, on the home tab in the ribbon, click Insert.

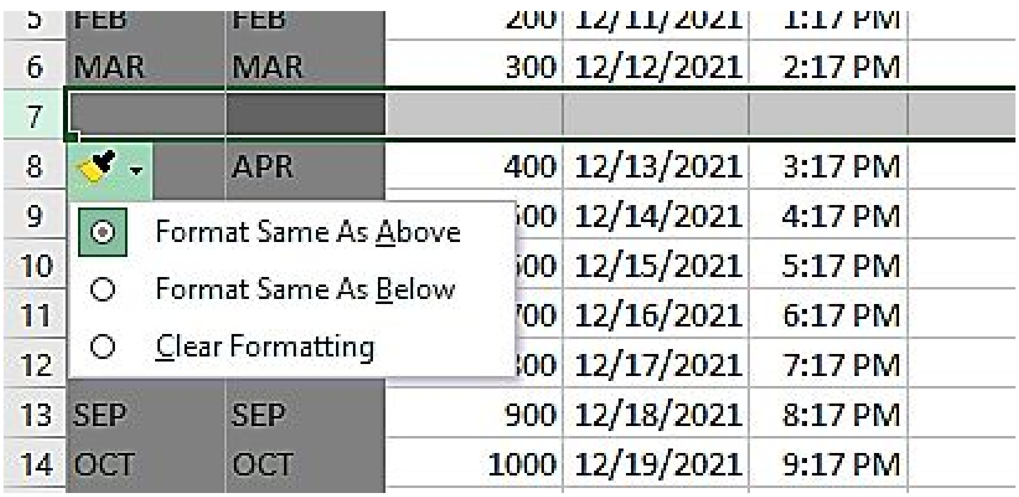


The newly inserted column will display at the left of the column you selected



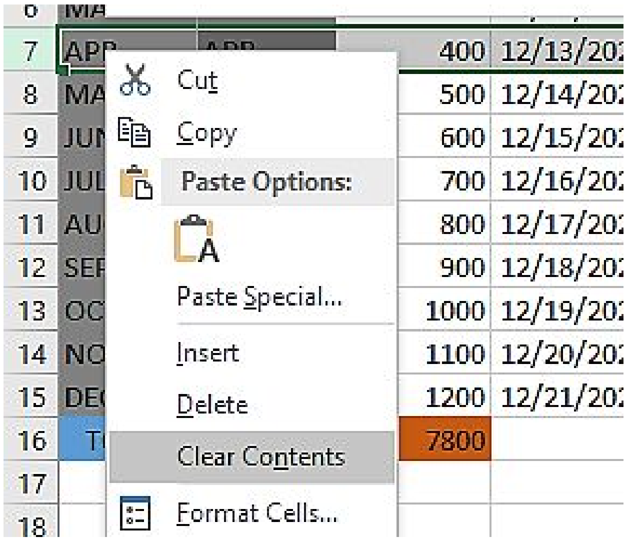
	A	B	C	D	E	F	G
1	is			the	key	to	success
2			SALES REPORTS 2022				
3	MONTH		MONTH	SALES	DATES	TIME	
4	JAN		JAN	100	12/10/2021	12:17 PM	
5	FEB		FEB	200	12/11/2021	1:17 PM	
6	MAR		MAR	300	12/12/2021	2:17 PM	
7	APR		APR	400	12/13/2021	3:17 PM	
8	MAY		MAY	500	12/14/2021	4:17 PM	
9	JUN		JUN	600	12/15/2021	5:17 PM	
10	JUL		JUL	700	12/16/2021	6:17 PM	
11	AUG		AUG	800	12/17/2021	7:17 PM	
12	SEP		SEP	900	12/18/2021	8:17 PM	
13	OCT		OCT	1000	12/19/2021	9:17 PM	
14	NOV		NOV	1100	12/20/2021	10:17 PM	
15	DEC		DEC	1200	12/21/2021	11:17 PM	
16	TOTAL		TOTAL	7800			

Note: A paintbrush icon appears next to newly added rows, columns, or cells when you insert new rows, columns, or cells. This button enables you to customize the formatting of these cells in Excel. Excel formats added rows by default to match the formatting of the cells in the row above. Hover your cursor over the icon, then click the drop-down arrow to see more choices.



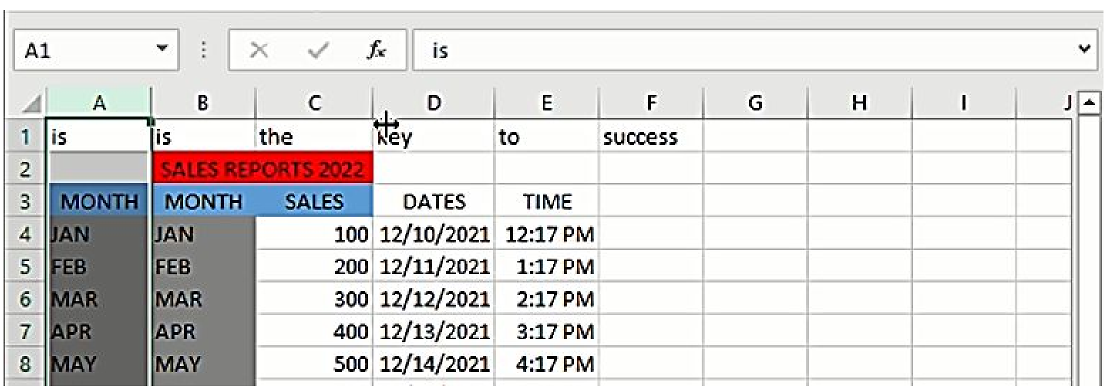
Deleting rows and columns

To delete a row, click on the row you want to delete, right-click and select **Delete**. Also, to delete a column, click on the column you want to delete, right-click and select **Delete**. Note that it is very important to know the difference between removing a row or column and merely erasing its contents. Right-click a heading, then pick **Clear Contents** from the drop-down menu to delete the content from a row or column without causing others to shift.



Changing column widths

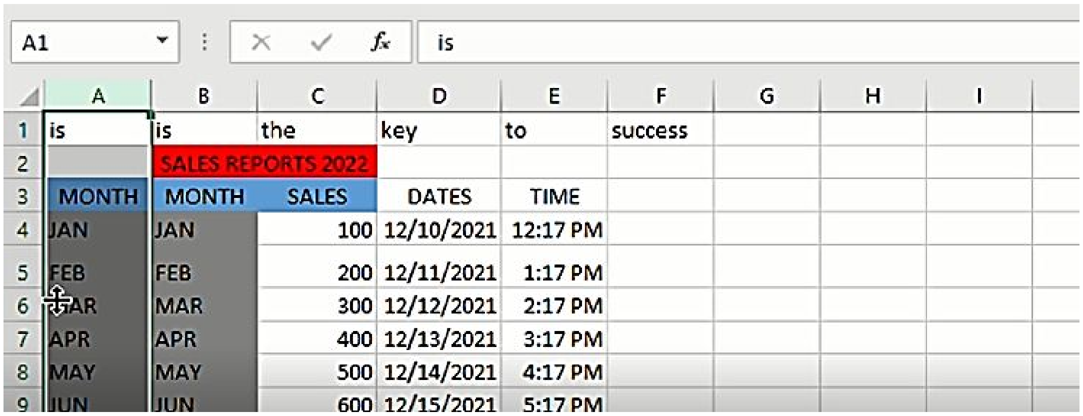
To do this, simply place your mouse cursor over the column line in the column heading. When you do this, the mouse cursor will change to a double arrow.



Then, click and drag the mouse left or right depending on how you want it to be. Then, release the mouse.

Changing row heights

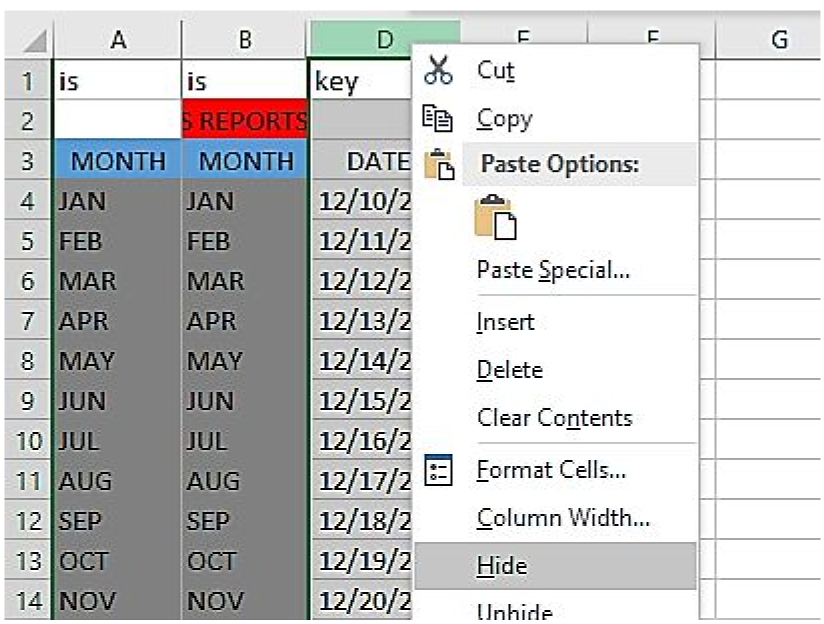
Place your mouse cursor over the row line. The mouse cursor will turn to a double arrow.



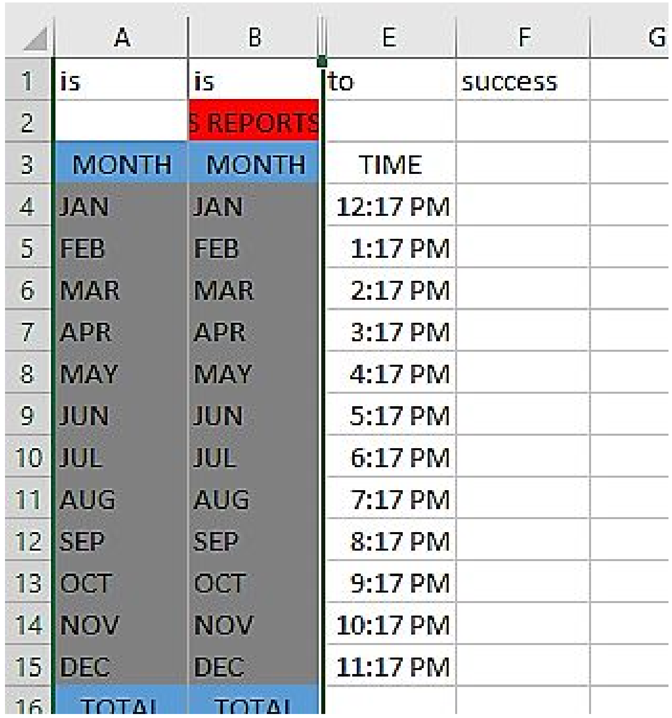
Then, click and drag the mouse up or down. Let go of the mouse.

Hiding rows and columns

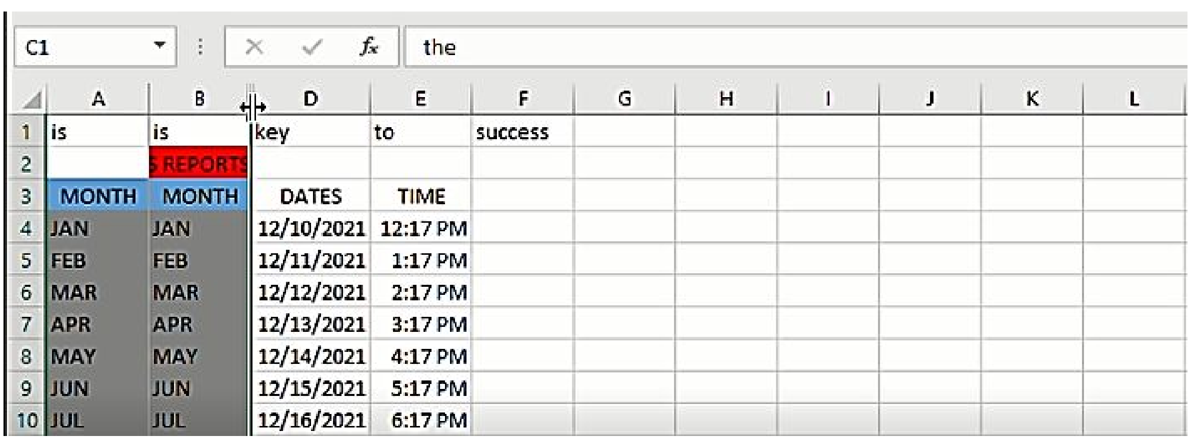
Simply choose the column(s) or row(s). Then, right-click on it and select **Hide**.



This action will hide the column. You will see a green line on the worksheet after you have hidden the row/column. The green line shows where the hidden column or row is.



To unhide the column or row, move your cursor in-between the two columns where the hidden column was i.e. on the green line, then right-click and click **Unhide**.



CHAPTER FOUR

WORKING WITH EXCEL RANGES AND TABLES

UNDERSTANDING CELLS AND RANGES

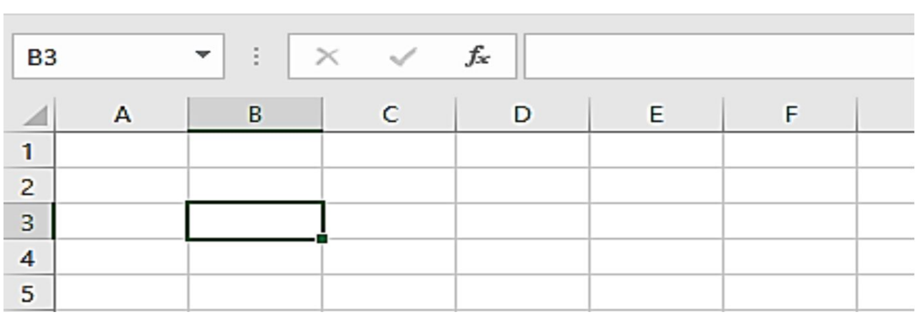
A cell range is a collection of cells that you choose to employ in functions and operations. A cell range is a set of chosen cells. This range is normally symmetrical (square), but it may also be made up of individual cells. A cell range may also be referenced in a formula.

A cell range is specified in a spreadsheet by the reference of the upper-left cell (minimum value) and the reference of the lower right cell (highest value). When different cells are eventually added to this selection, the range is referred to as an irregular cell range. The minimum and maximum values are supplied in Excel. A mathematical range, on the other hand, is a collection of values between a maximum and lowest value.

Select Single Cell Range

The intersection of the row and column in Excel is referred to as a single cell. When you click on any cell on the Excel sheet, you'll see a column name and a row name.

Let's look at the picture below as an example. The intersection of column B and row 3 is the cell chosen below. The cell may be interpreted as B3, which is a mix of row and column names.



Selecting complete columns

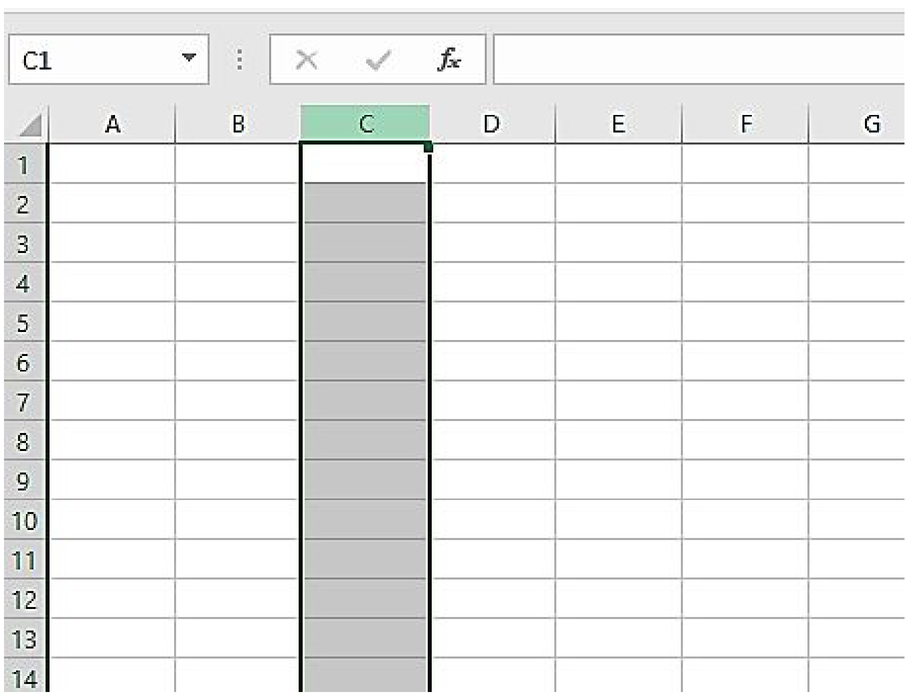
When you select all column cells in Excel, the range is also described. You may use either your mouse or your keyboard to pick all the cells in a column, depending on your preference. The techniques for selecting all column cells are shown below.

Mouse

- Click the column cell name with the mouse.

Keyboard

- Pick the column for the cell.
- Press and hold the 'ctrl' key while pressing the ‘**space'** key.

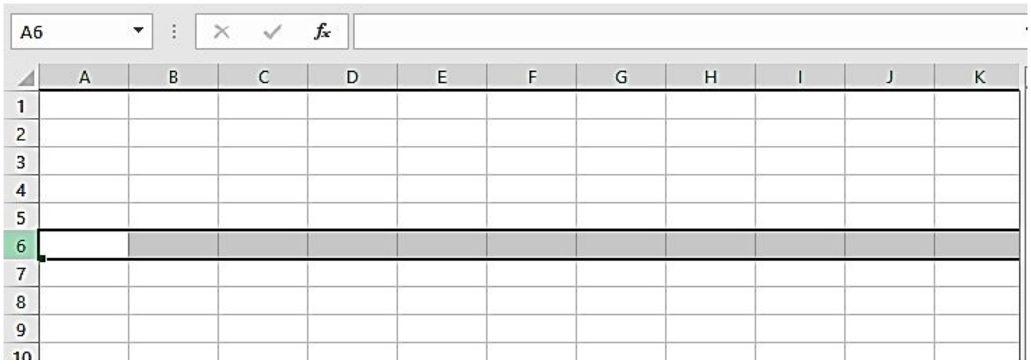


Assume you wish to pick the cells in column C in the picture above. Simply click on the C column name.

With the keyboard, go to column C. Then, while holding the ‘**control key’** hit the ‘**space' key** on your keyboard.

Selecting complete rows

- With the mouse, click the row letter of the cell.
- With the keyboard, use the arrow keys to move to the cell.
- Press the ‘**shift'** key and hit the ‘**space'** key to select a row.

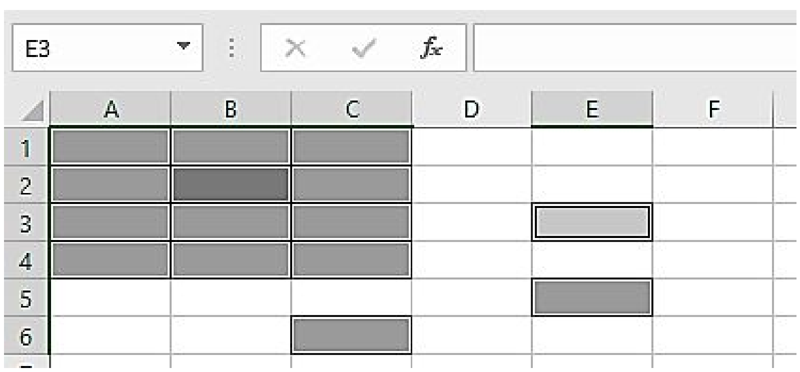


To choose a row, as shown above, do so. You must click the row's name. You may also use your keyboard shortcut to choose a row. Using the arrow keys on your computer, go to any cell in row 6. Now, while holding down the ‘**shift'** key, press the ‘**space'** bar on your keyboard.'

Selecting noncontiguous ranges

To choose noncontiguous ranges, follow the procedures outlined below:

- Using the mouse, click on the start cell.
- Press and hold the Control key on your keyboard.
- Select the cells you wish to select by clicking on them.

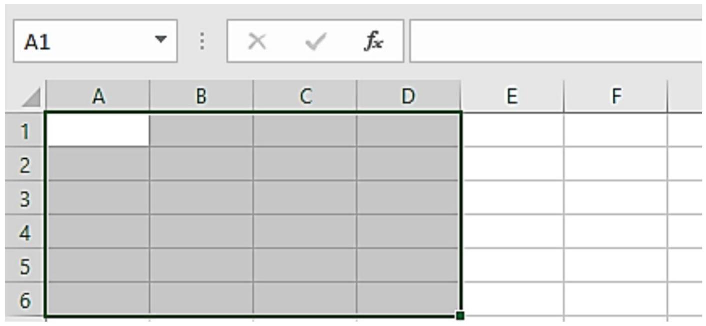


Assume you wish to choose the range (A1:C4, C6, E3, E5) shown in the figure above. Using the arrow keys on the keyboard, click or visit the initial cell. Now press C4 while holding down the 'ctrl' key. With the Control key held down, click C6, E3, and E5 cells again to select them.

Selecting multi-sheet ranges

It's a technique for picking many cells in a certain pattern, such as squares or rectangles. This approach may be used to pick both tiny and big areas of cells. Follow the procedures shown below to choose your pattern.

- Use the mouse or keyboard to go to the first cell.
- Press and hold the ‘**Shift'** key on your keyboard.
- Select the last cell.

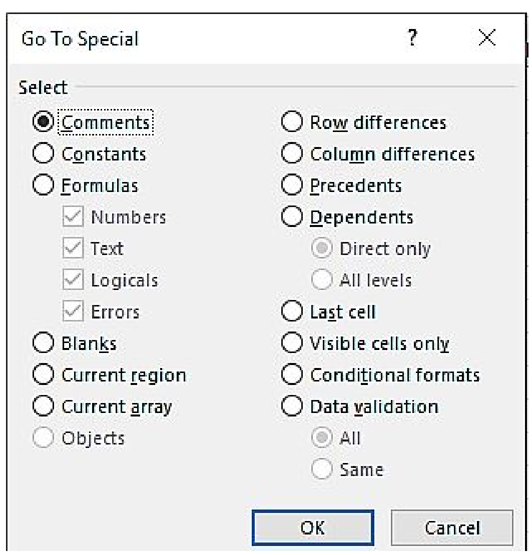


Assume you wish to choose the range (A1: D6), as shown in the figure above. To begin, use your mouse or keyboard to go to cell A1. Now press the ‘**shift'** key on your keyboard and click cell D6. As seen in the graphic above, this will choose the needed cell range.

Selecting special types of cells

You may copy, move, remove, color, fill, and protect specific cells on a sheet, such as cells holding Constants, Formulas, blank cells, and more. To select particular cells, follow these steps:

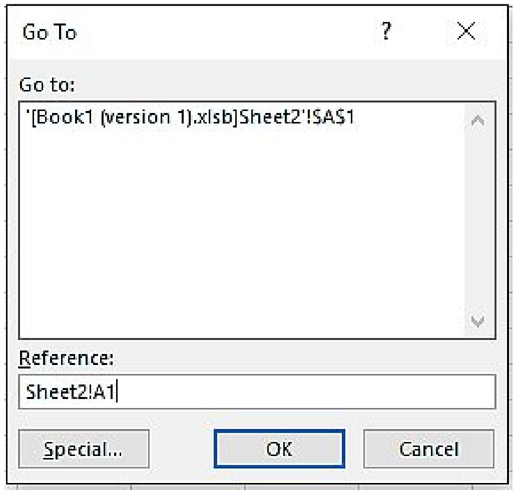
- Press Control key + G on your keyboard.
- This opens up the Go to the dialog box. Click on Special.



- Click OK after selecting one of the available buttons.

Selecting cells by searching

- Press Control key + G on your keyboard.
- Type in the cell and click Ok.

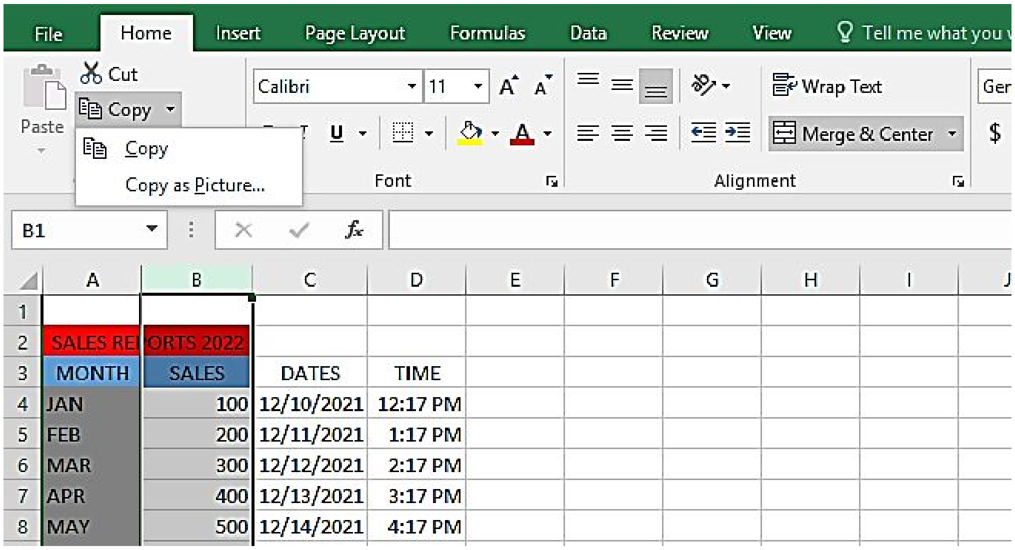


COPYING OR MOVING RANGES

There are different ways to copy and move ranges in Excel. In Excel, copying and pasting a cell is simple. When it comes to copying and pasting a collection of cells, columns, or rows, there are ways for it.

Copying by using Ribbon commands

Click on the cell range heading (row or column). Select Copy from the home tab. To copy as a picture is possible also.

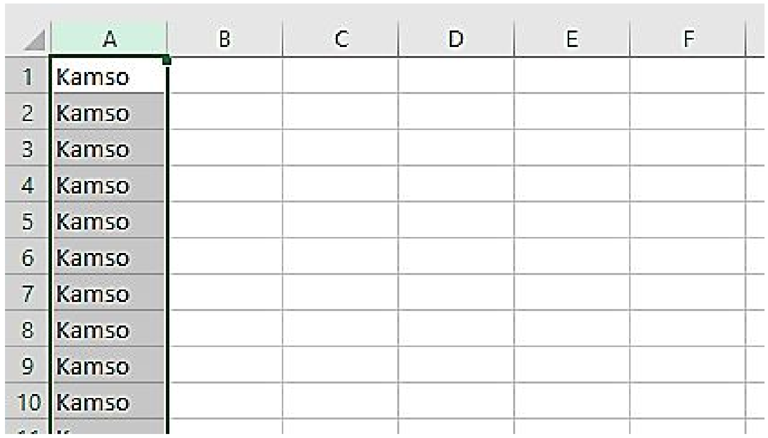


Copying by using shortcut keys

To copy a range of cells, use Control key + C simultaneously after choosing the range of cells. Choose a range of cells in which you wish to paste it again, and then click Control key + V to paste it. This is the most convenient method for copying and pasting several cells at once.

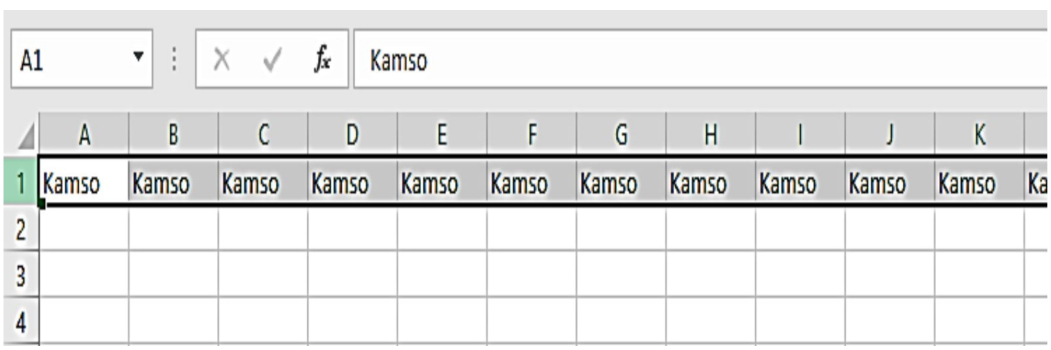
Other shortcut keys are Control key + D and Control key + R. Control key + D is used for copying and pasting data downwards. It can also copy the values of a full column. To do this, choose any range of cells that are in the same column as the cell you want to replicate.

Now, press Control key + D. this action will copy the values downwards.

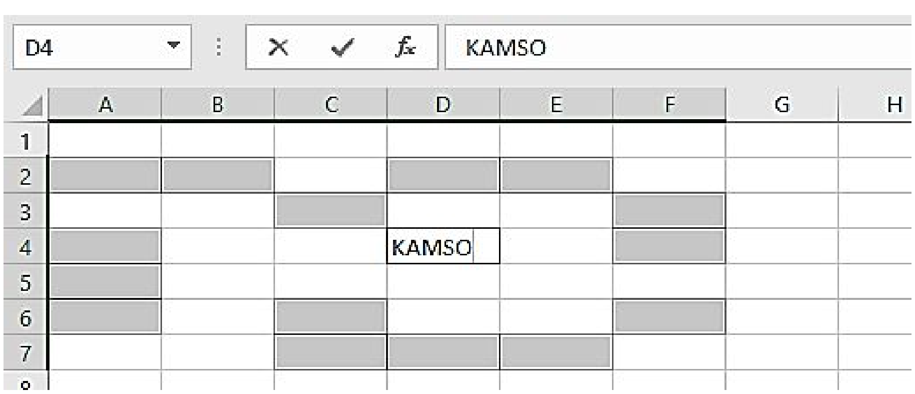


Control key + R also does the same action, but this time, it copies the values to the right-hand side. This shortcut works well for rows. To do this, simply click on the cell range, but this time you are not choosing from the bottom up, choose the cells from the right.

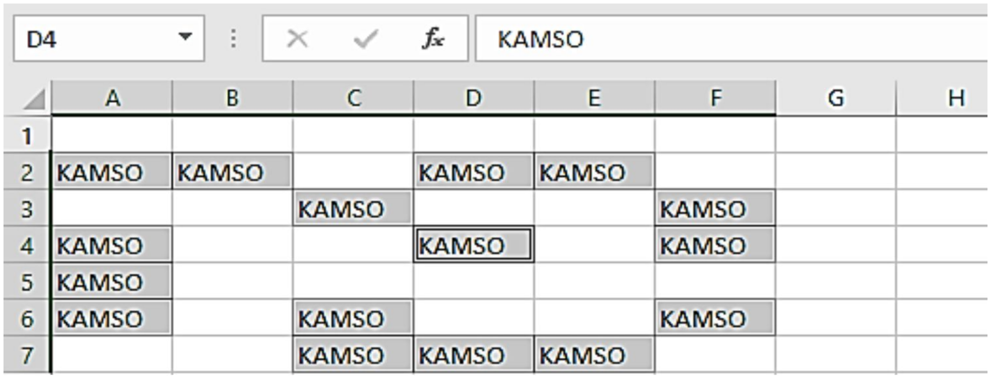
After you have selected it, press the Control key + R.



You may also duplicate a single value to several cells using another shortcut. Control key + Enter is the shortcut. To do so, pick a few cells on your worksheet and type any term or value into any of them. After selecting the cells, press Enter to put in a value in any of the cells.



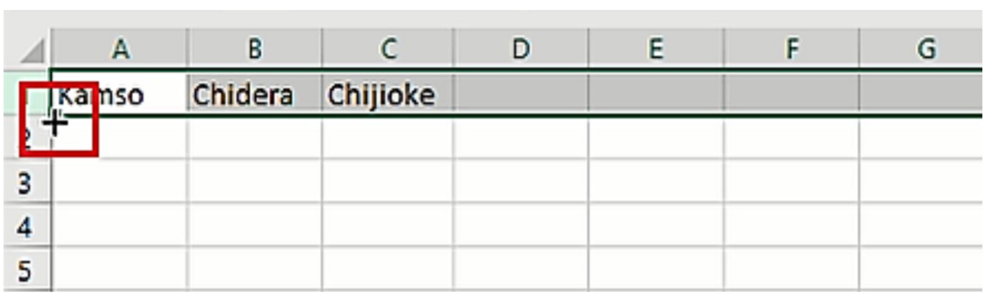
Now, press the **Control key + Enter**.



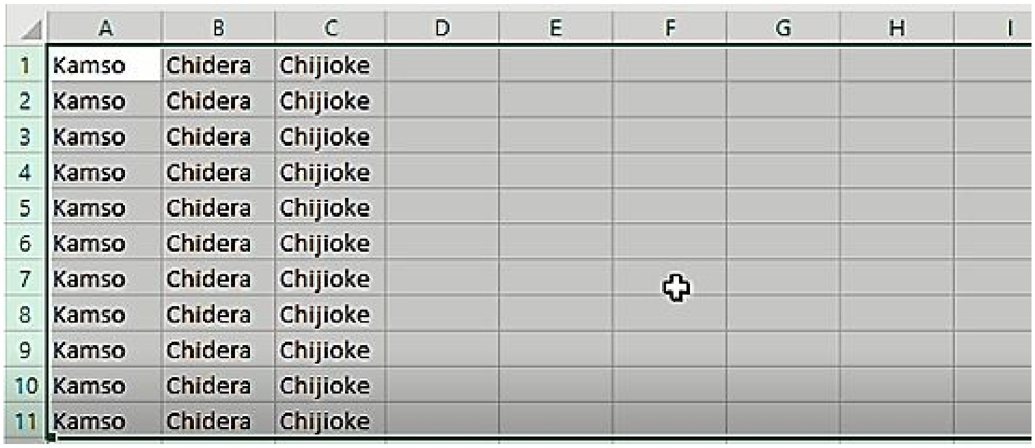
Copying or moving by using drag-and-drop

For copying a set of values for columns, rows, or a range of cells, we will make use of the **Fill Handle** option. To do so, enter some values in the appropriate cells. Select the cells after inputting the data. The value is surrounded by a green box.

In Excel, this green area is called the Fill Handle. Drag the fill handle down to replicate these values for a range of cells by hitting the "+" symbol that appears in the bottom right corner of the fill handle.

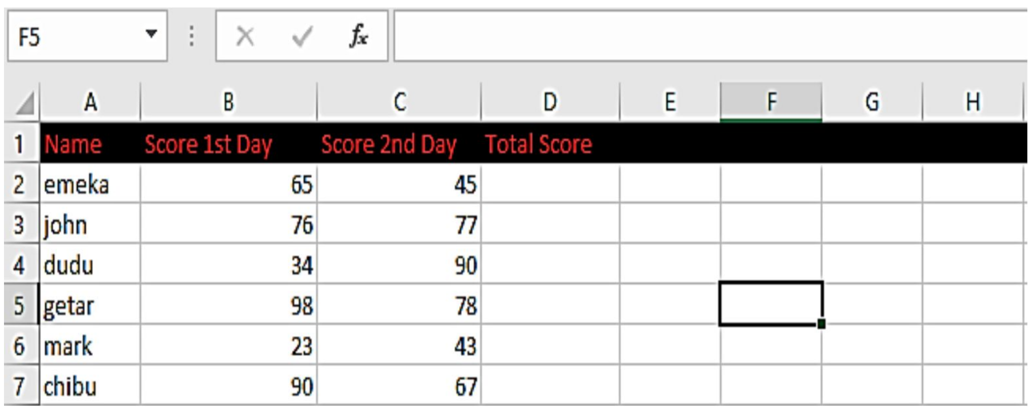


Once you stop dragging the handle, you will get the result, as you can see below.

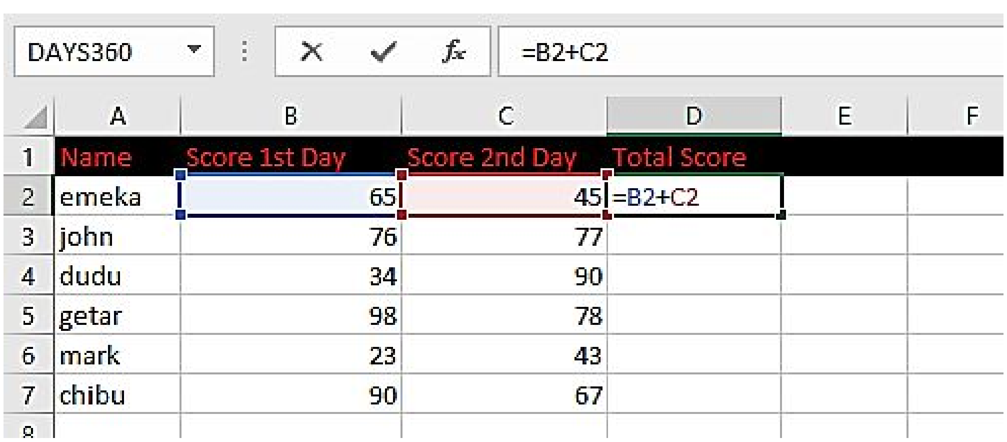


Copying to adjacent cells

So in our example below, there are data in range A1:C7.



Column D is empty and it will consist of the total score of the table. To do this, we are to copy and paste the formula for that. Now, in Cell D2, enter in this formula **"=B2+C2",** then press **Enter**. As you can see in the image below;



Then, using the fill handle, drag down and release to fill in the empty cells.

	A	B	C	D	E
1	Name	Score 1st Day	Score 2nd Day	Total Score	
2	emeka	65	45	110	
3	john	76	77	153	
4	dudu	34	90	124	
5	getar	98	78	176	
6	mark	23	43	66	
7	chibu	90	67	157	

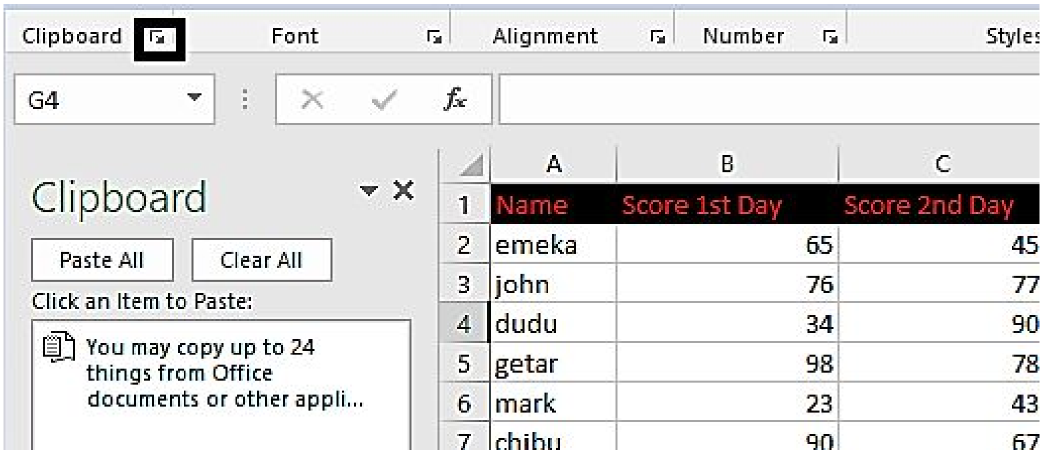
Now, we want to copy a range of cells to the adjacent side. So, select the range of cells. In this example, we want to copy the Total Score column. To do this, we will select the cell on the right-hand side which is Cell E. when you select it, press **Control key + R**.

A	B	C	D	E
Name	Score 1st Day	Score 2nd Day	Total Score	Total Score
emeka	65	45	110	155
john	76	77	153	230
dudu	34	90	124	214
getar	98	78	176	254
mark	23	43	66	109
chibu	90	67	157	224

Using the Office Clipboard to paste

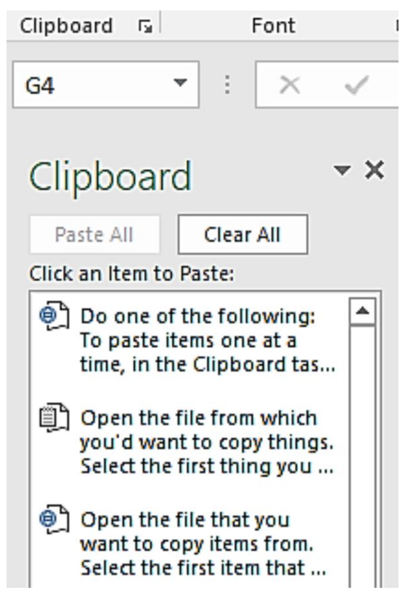
You may copy up to 24 things from Office documents or other applications and paste them into another Office document using the Office Clipboard. You can paste text from an email message, data from a workbook or datasheet, and a graphic from a presentation into a document, for example. You may organize the copied objects in the document as you wish using the Office Clipboard.

When you utilize the Clipboard task window, you're not restricted to copying the last thing you copied or cut. Many of the last pictures and text you copied or cut are stored in the Clipboard task window. First, Open the Office Clipboard. On the Home tab, click on the Clipboard dialog box launcher.



Now to copy and paste, follow the steps below;

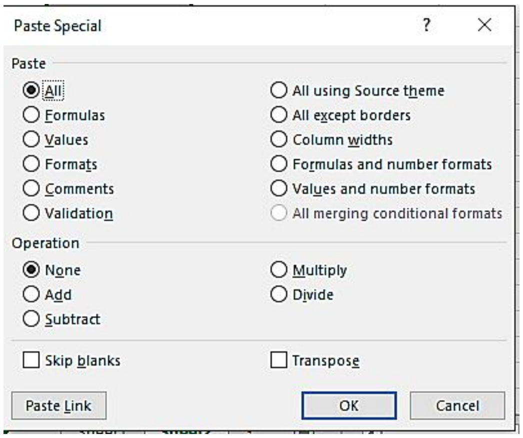
- Open the file from which you'd want to copy things.
- Select the first thing you wish to copy and click CTRL+C on your keyboard.
- Continue copying stuff from the same or other folders until you've gathered all you desire. Up to 24 things may be stored on the Office Clipboard. The initial item on the Office Clipboard gets destroyed after you copy the twenty-fifth item.
- Now, open the clipboard pane. On it, you will see all the things you've copied. You can select each item to paste or you can paste all of them. So, to paste one item, click on the item. to paste all items, click on the **Paste All** box on the clipboard pane.



Pasting in special ways

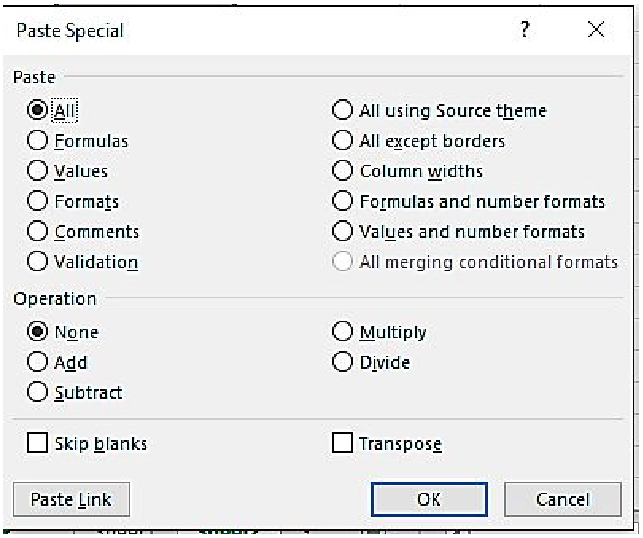
When a conventional copy/paste isn't suitable, Excel's Paste Special provides a variety of choices, such as pasting just certain portions of copied cells or performing a mathematical function on the copied data.

All of the Paste Special options are shown in the image below:



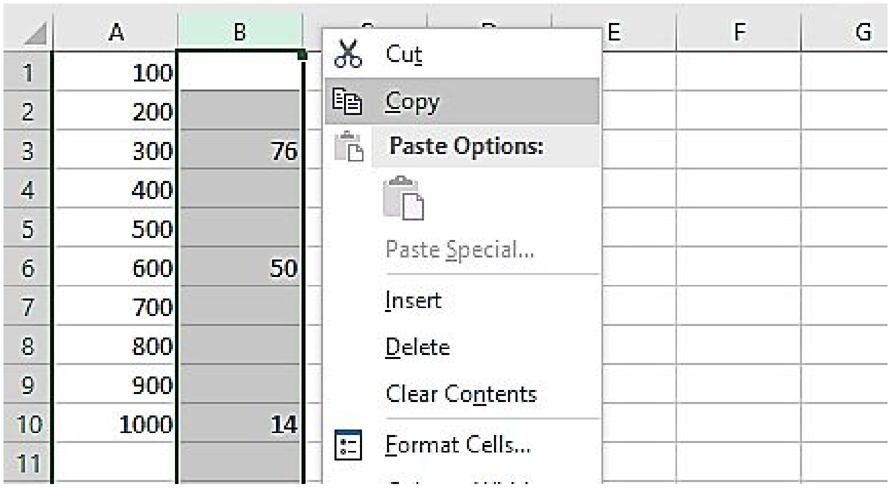
Using the Paste Special Dialog box

This is an easy process. Select the cell or range of cells and right-click on the area you wish to paste the item on the workbook and select **Paste Special**. This will open up the Paste Special Dialog box where you have a list of options on how you can paste the copied item.



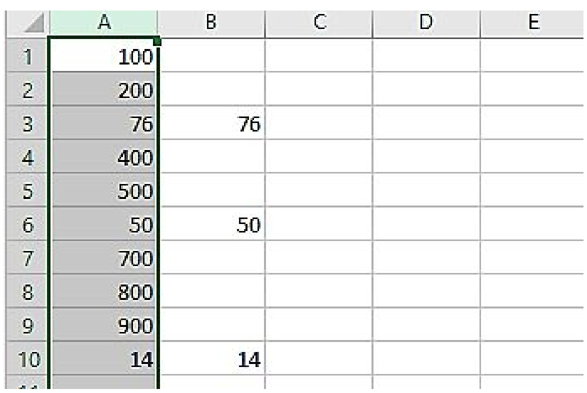
Skipping blanks when pasting

So, we will make use of the Paste Special Skip Blanks Option to do this. As you on the image below, range B1:B10 has some blank spaces in its cells. So we are going to copy the range and skip those blanks. So, copy Cell B.



Now, select cell A1. Right-click on it and select Paste Special.

Check the box on Skip Blanks and click **Ok**.



USING NAMES TO WORK WITH RANGES

However, there are certain key requirements for naming named ranges in Excel that you should be aware of before you begin:

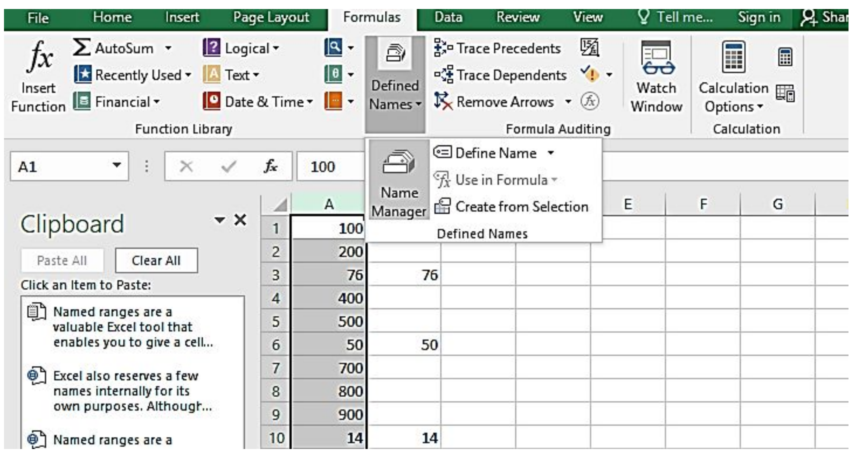
a. There are no spaces allowed in names. Instead of using a space, you might use an underscore character (such as Annual Total).
b. You may name the range with any combination of alphabets and digits, but it must begin using a letter symbol. A number cannot begin a name.
c. Except for underscores and periods, no other symbols are permitted.

d. Although names are restricted to 255 characters, it is best to make them as brief as possible while still being relevant and clear.

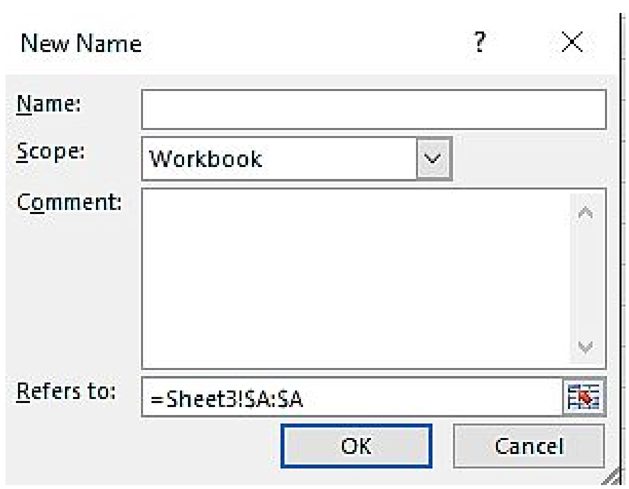
Excel also keeps a few names in reserve for internal use. Although it is possible to construct names that override Excel's internal names, this is something you should avoid.

Creating range names in your workbooks

Choose the cell or range. Click the Formula tab on the ribbon. Navigate to the Define Names section. Click the down arrow and select **Name manager**.



Click on New. This opens up the New Name dialog box.

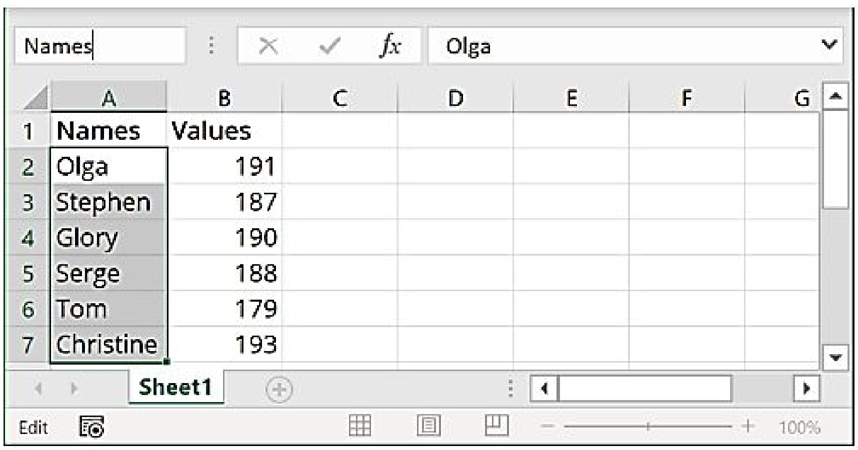


In the Name box, type a name (Excel can display the name if you selected a data range with a heading line). In the area labeled Refers to, the active or chosen cell or range address shows. To add the name to your spreadsheet and exit the dialog box, double-check that the address provided is accurate.

Using the Name box to construct a name is a quicker option:

Choose the cell or range, then input the name. Press Enter. (If you input a name and then click on the worksheet, Excel will not assign the name to the chosen range.) You can't modify the range that a name refers to if it already exists. Instead of selecting the range, attempting to do so choose it.

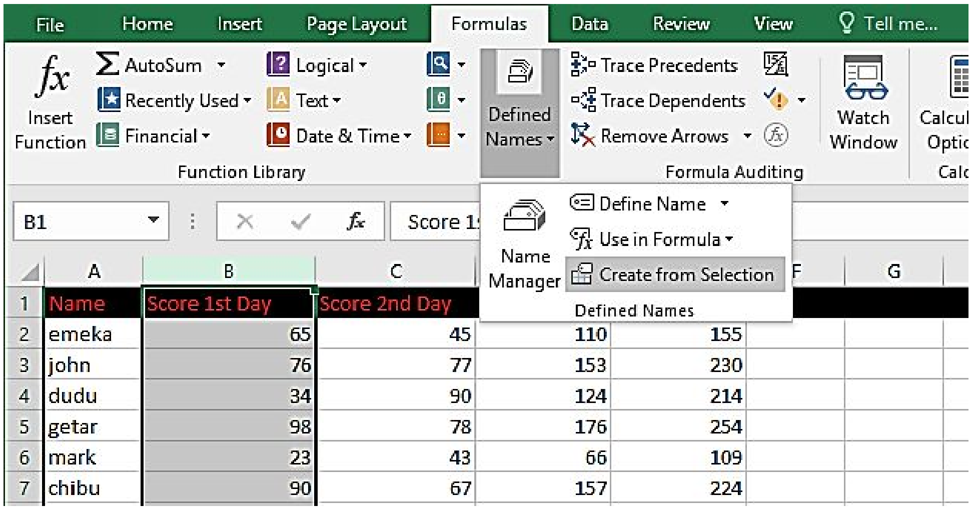
For instance:



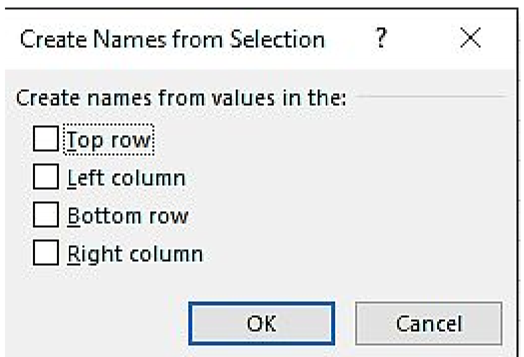
If your formula contains named cells or ranges, you can either input the name instead of the address or select a name from a table, then Excel will automatically insert it. Names and Values are two specified names on the worksheet.

Using the Create Names from Selection dialog box

You may rapidly generate names for numerous cells by using existing row or column labels. Choose the cell range and labels. In the Defined Names group of the Formulas tab, pick **Create from Selection**.



Select the place of the text and click **OK**.

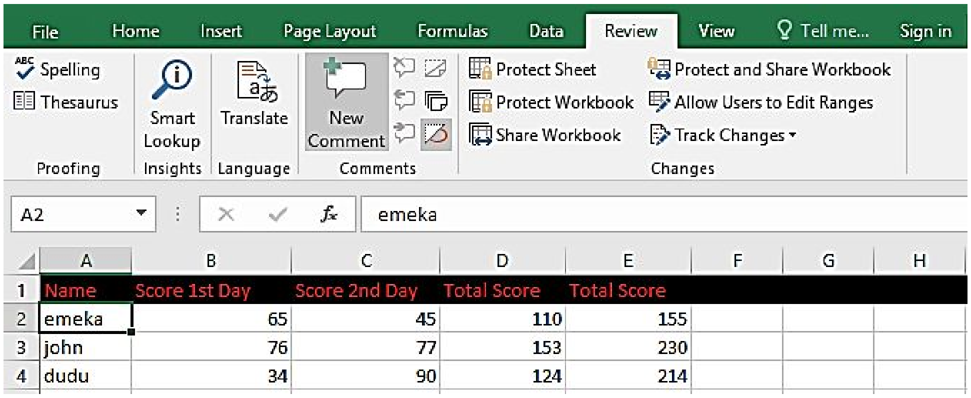


ADDING COMMENTS TO CELLS

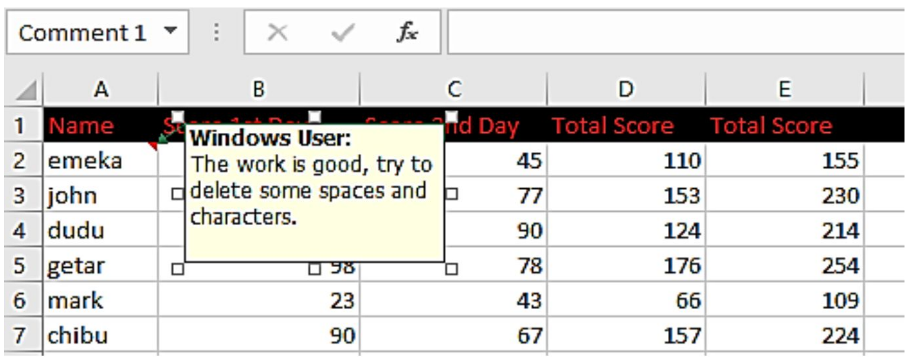
Let's say you've gotten an Excel document from someone and you'd want to provide comments, make edits, or ask questions about the data. Writing a comment to a specific cell in the worksheet is a simple way to do this. Because it doesn't modify the data, a comment is typically the easiest approach to add extra information to a cell.

This tool is also useful for explaining formulae to other users or describing a specific value. You may use an image instead of words to describe something in a comment. Follow the steps below to add comments to cells.

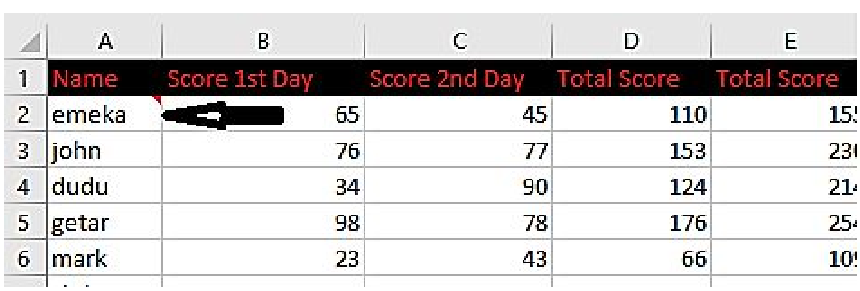
- First, choose the cell you would like to add a comment on.
- On the ribbon, click on the Review tab, then select New Comment.



This will display a small box on the screen. Type in your comment in the box. When you are done, click on any cell.



The comment box will disappear. But you will notice a red mark on the column you have just added a comment. That red mark indicated that the cell contains a comment. When you hover your mouse cursor on the cell, it will display the comment.

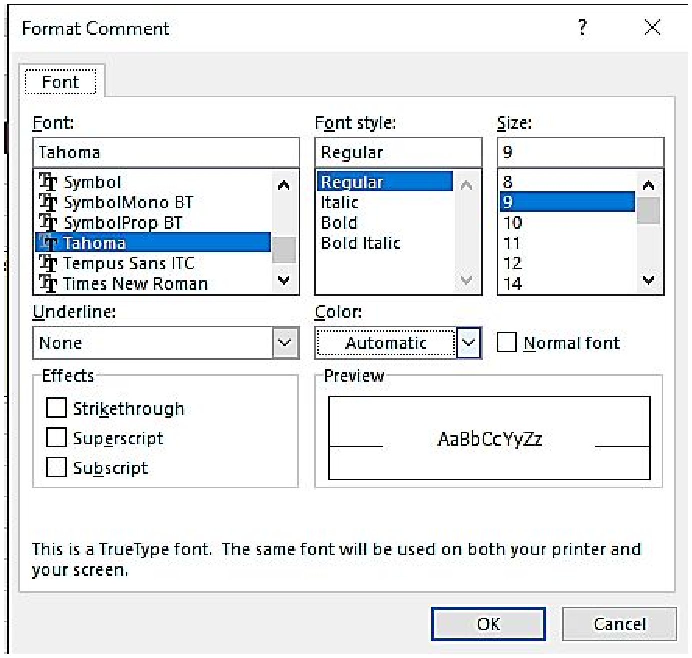


Shift key + F2 will perform the same action here.

Formatting comments

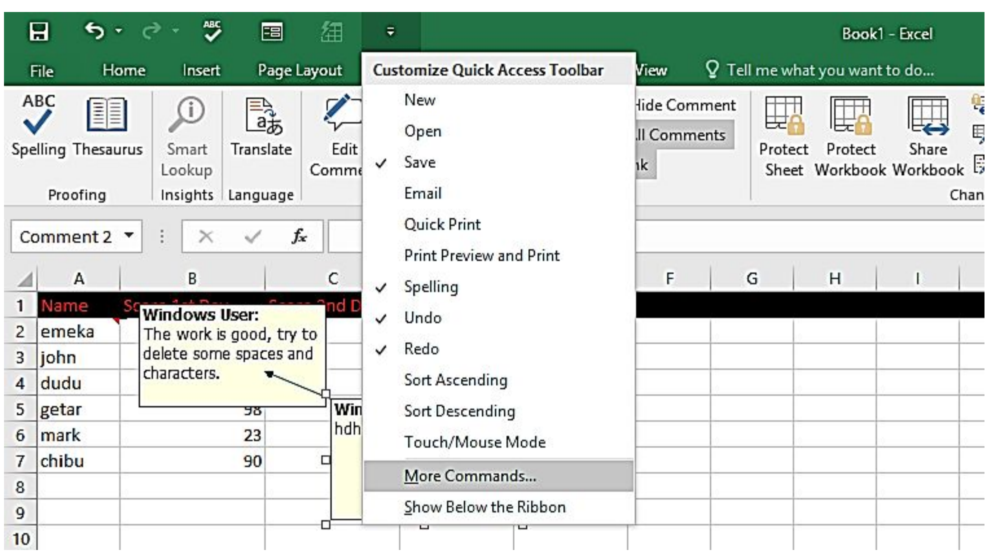
To format the comments, hover your mouse cursor to the cell to display the comment box. Once it has been displayed, right-click on it and select

Format Comments. This will bring up the Format Comment dialog box. After formatting, click **Ok**.

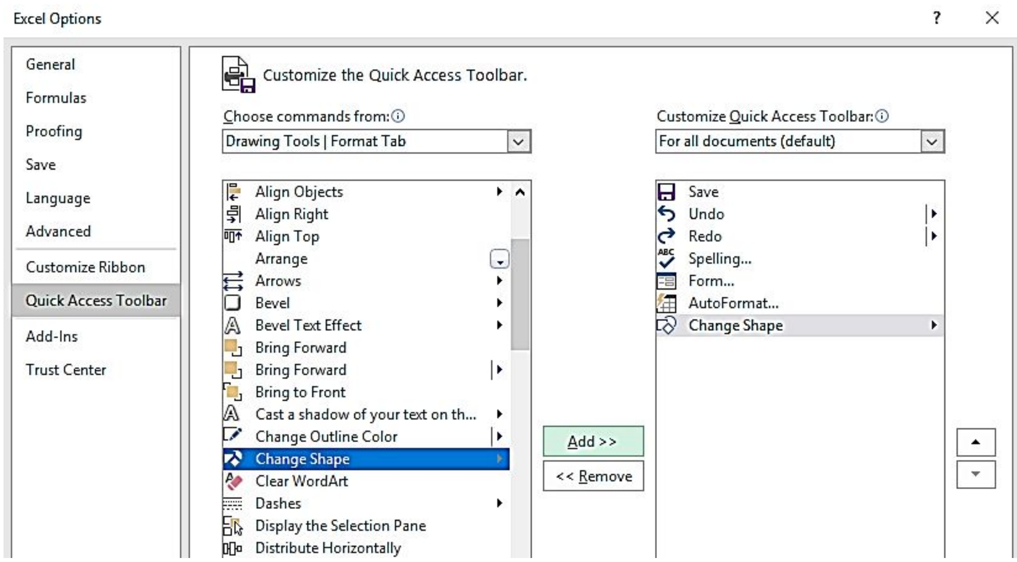


Changing a comment’s shape

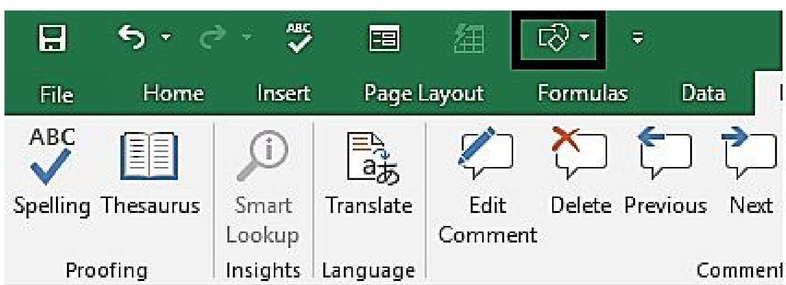
By default, the shape of the comment box is a rectangle. You can decide to change this shape. You will add a tool to the Quick Access Toolbar. So, click the down arrow on the Quick Access Toolbar and select More Commands.



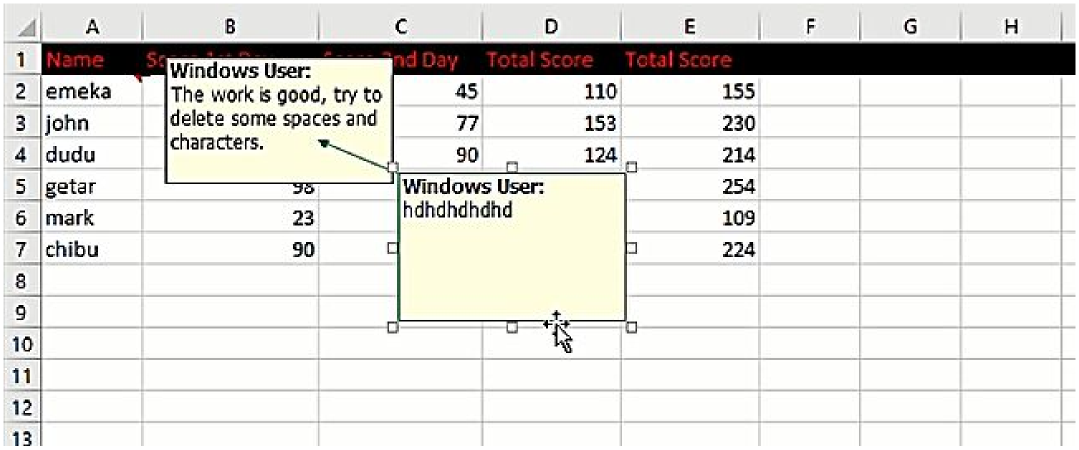
On the **Choose commands from** option, hit the down arrow and select **Drawing Tools |Format Tab.** From the list of commands below the options, select Change Shape. Then, click Add and click Ok.



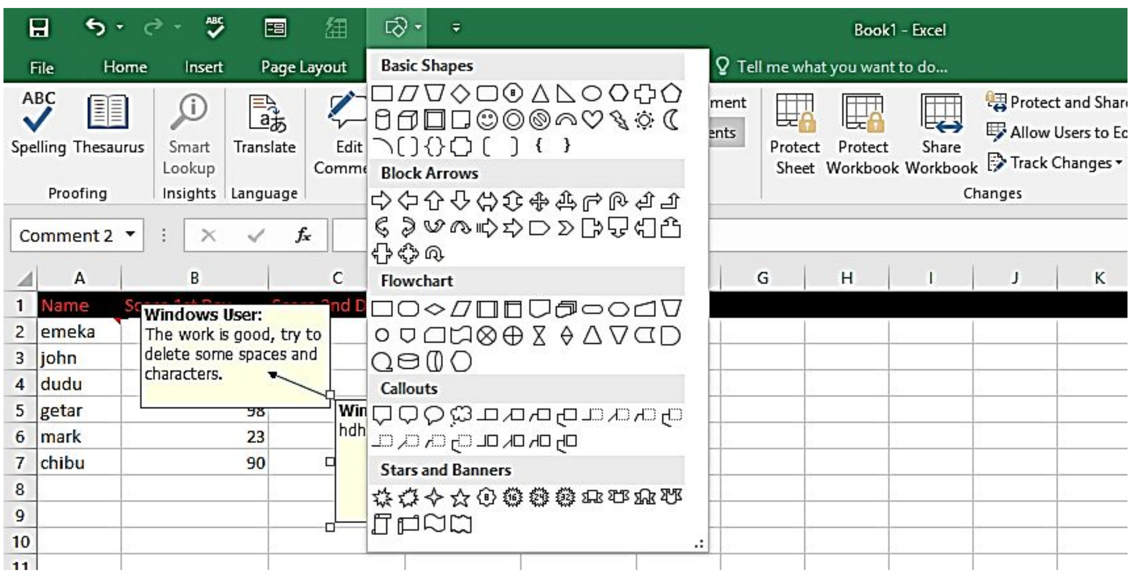
The shape icon will be added to the commands in the Quick Access Toolbar.



At first, the shape icon won’t be accessible. So, you have to first work on the comment box. Click on the comment box and move your cursor around it until it switches to the four-headed arrow. Then, click.

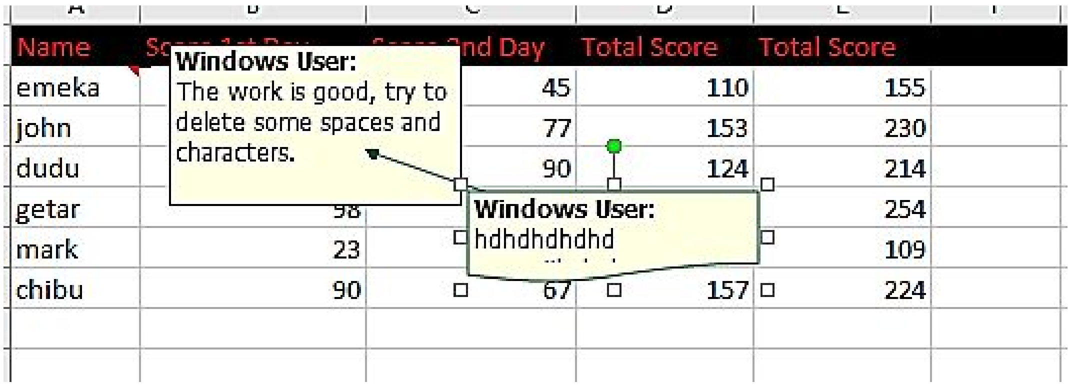


The shape icon will be accessible now. So, click on it. This will display a box that consists of different shapes. Select any shape.



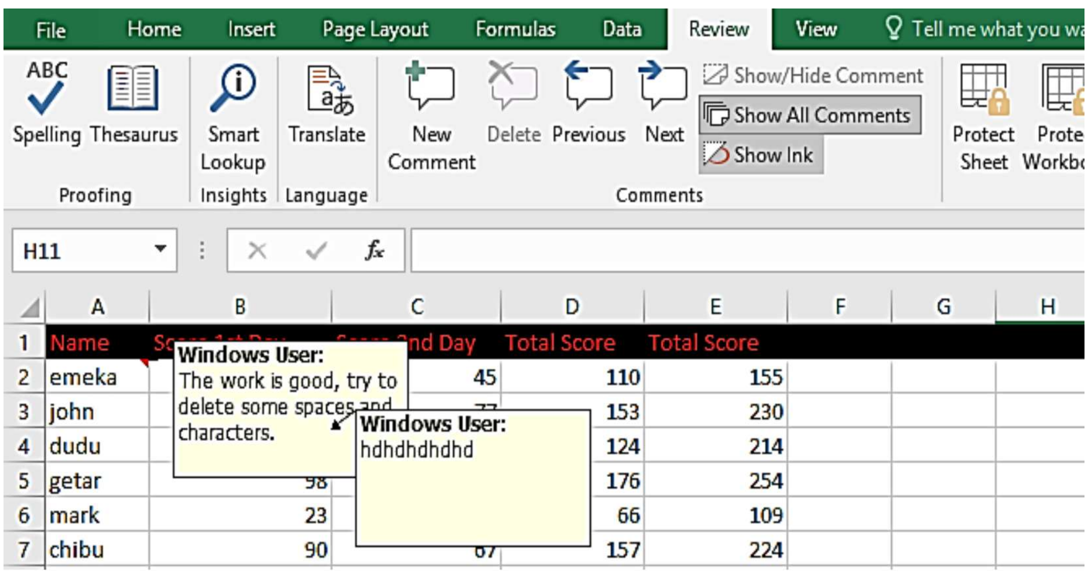
Resizing comments

Most times, when you change the shape of the comment box, the text inside will no longer fit into the comment box. You can solve this issue by resizing the comment box. To do this, click on the comment box, then click on the sizing angles around it (the small transparent boxes) and then drag it to the size you want.



Hiding and showing comments

Simply click on the **Review tab** and select **Show All Comments**.



To hide the comments, click on **Show All Comments** the second time.

Editing comments

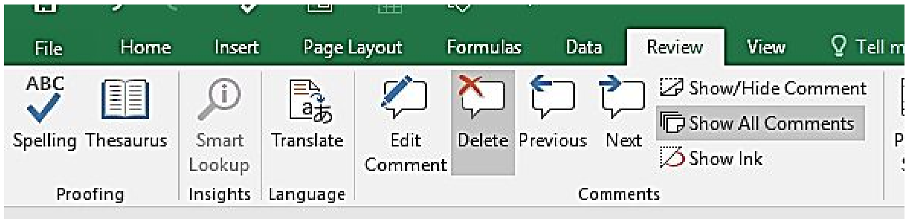
Right-click on the cell that has the comment on it and selects **Edit Comments**.

This opens up the comment box. Now, you can click on it and start making changes to it or you can right-click and select **Format Comment** to make more edits.

Deleting comments

You may not want a comment to be on a cell again and you want to delete it. Right-click on the cell, then select Delete Comments from the options.

Also, do this with the Review Tab. Select the **Delete icon**.



WORKING WITH TABLES

Microsoft Excel makes it simple to create tables and do computations. Its working area consists of a series of cells that must be filled with information. As a result, the information may be structured and utilized to create graphs, charts, and summary reports.

Working with tables in Excel may seem hard at first look to a novice. It varies significantly from Word's table creation concepts.

Understanding a table's structure

A table in excel consists of many elements which are explained below;

The header row

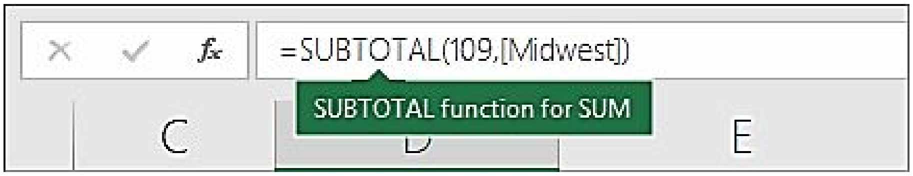
Every table in Excel consists of a header row. The columns in a table have filtering enabled in the header row. This is to enable you to filter your table as well as sort it easily.

Calculated columns

You may build a calculated column by inserting formula in one cell in a table column and having that formula automatically applied to all other cells in that table column.

The total row

When you add a total row to a table, Excel provides an AutoSum drop-down list from which you may choose among functions like SUM, AVERAGE, and others. When you choose one of these choices, the table will convert it to a **SUBTOTAL** function, which by default ignores rows that have been concealed by a filter. You may adjust the SUBTOTAL function parameters to include hidden rows in your computations.

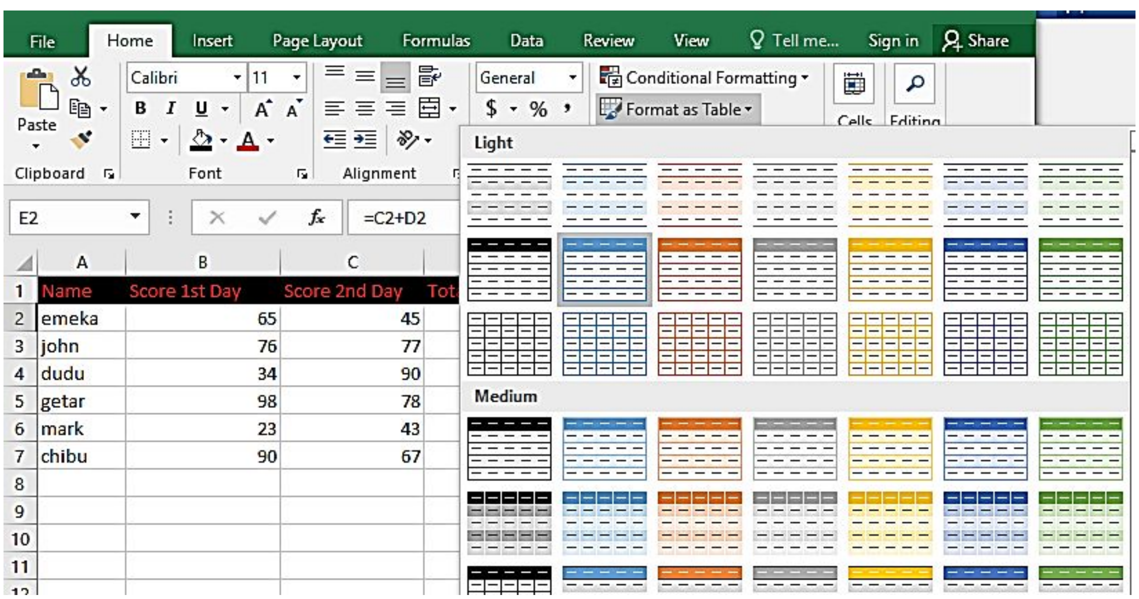


Creating a table

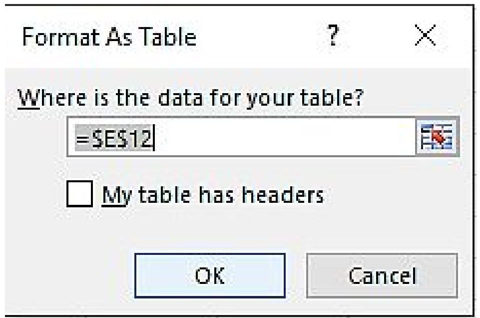
Tables in Excel are useful for providing data collections structure. It contains several useful features, such as data organization, headers, and applied filters. Tables may be accessed via the Insert menu tab or the shortcut key **Control key + T**. All we have to do now is choose the range of cells we want to include in the table. The Design tab, which appears when we pick the table, allows us to adjust table styles. Follow the steps below to create a table.

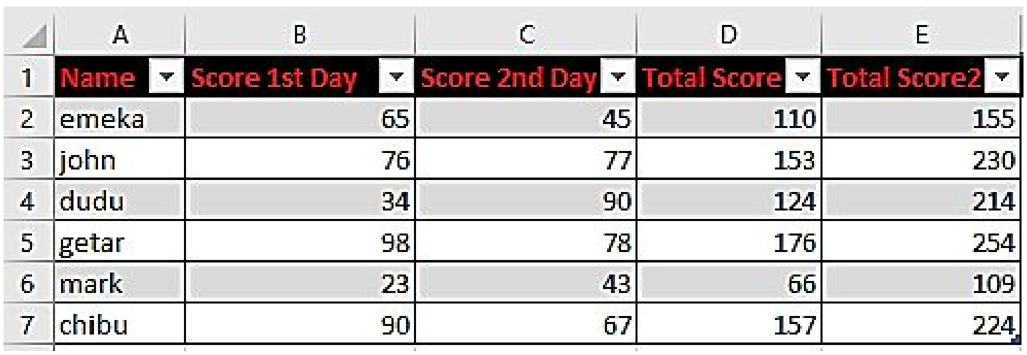
Choose the cell or range you want to create the table on.

Click on the Home tab, then click on **Format as Table**. This will display a menu that consists of some table styles. Choose any style you want.



When you click on the style you want, a dialog box will open. Check the box on the My table as header (Checking this box makes the first row of the range the header row) and click Ok.

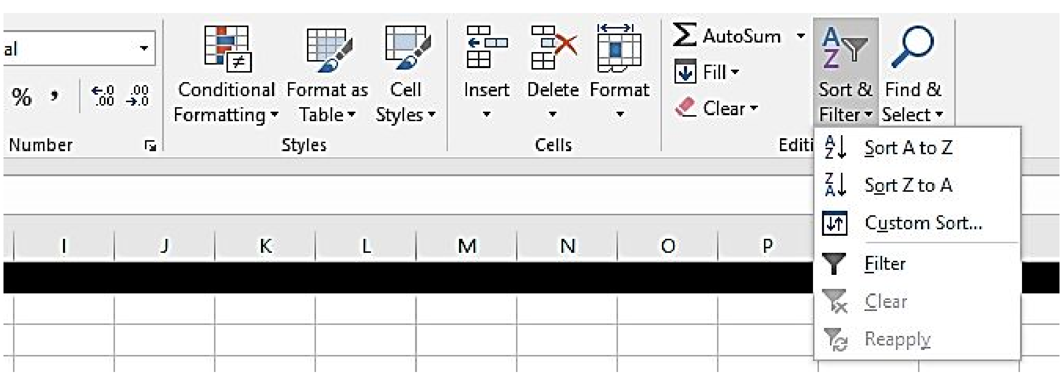




	A	B	C	D	E
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2
2	emeka	65	45	110	155
3	john	76	77	153	230
4	dudu	34	90	124	214
5	getar	98	78	176	254
6	mark	23	43	66	109
7	chibu	90	67	157	224

Sorting a table

One of the most frequent data management tools is sorting. You may sort your table in Excel by one or more columns, ascending or descending order, or by performing a custom sort. First, click on the cell. Then, click on Sort & Filter.

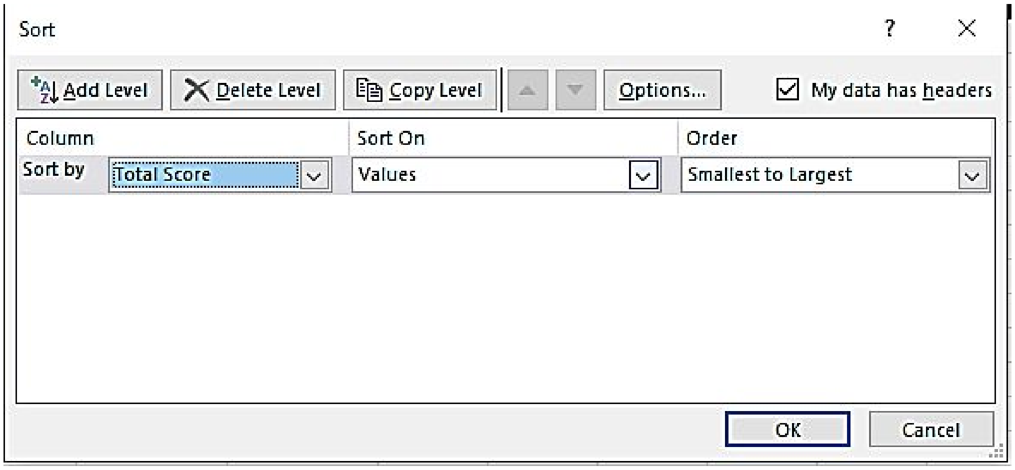


You will have different sorting options.

- **Sort A to Z:** This is to sort in ascending order
- **Sort Z to A:** This is to sort in descending order

- **Custom Sort:** This is for applying various sort criteria in multiple columns.

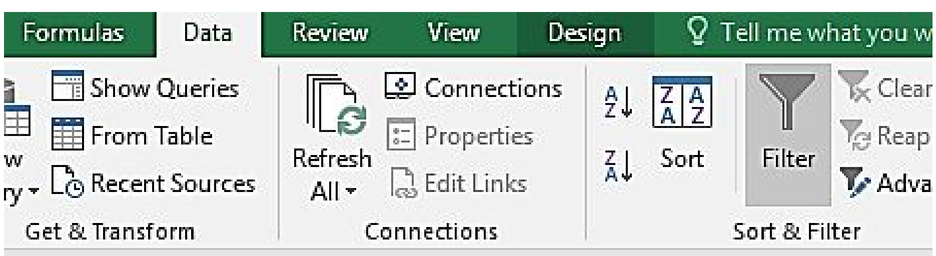
Click on **Custom Sort**, then click **Add Level**.



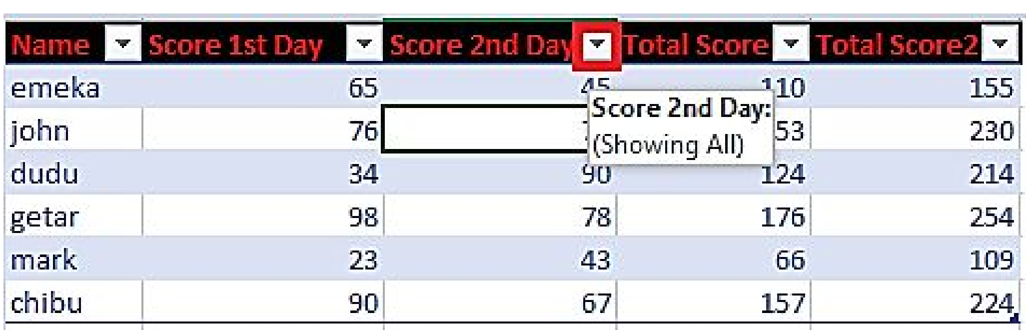
Then, enter in how you want it to be sorted. Once you are done, click Ok.

Filtering a table

Click on cell on your worksheet. On the ribbon, click on the Data tab, then select Filter.

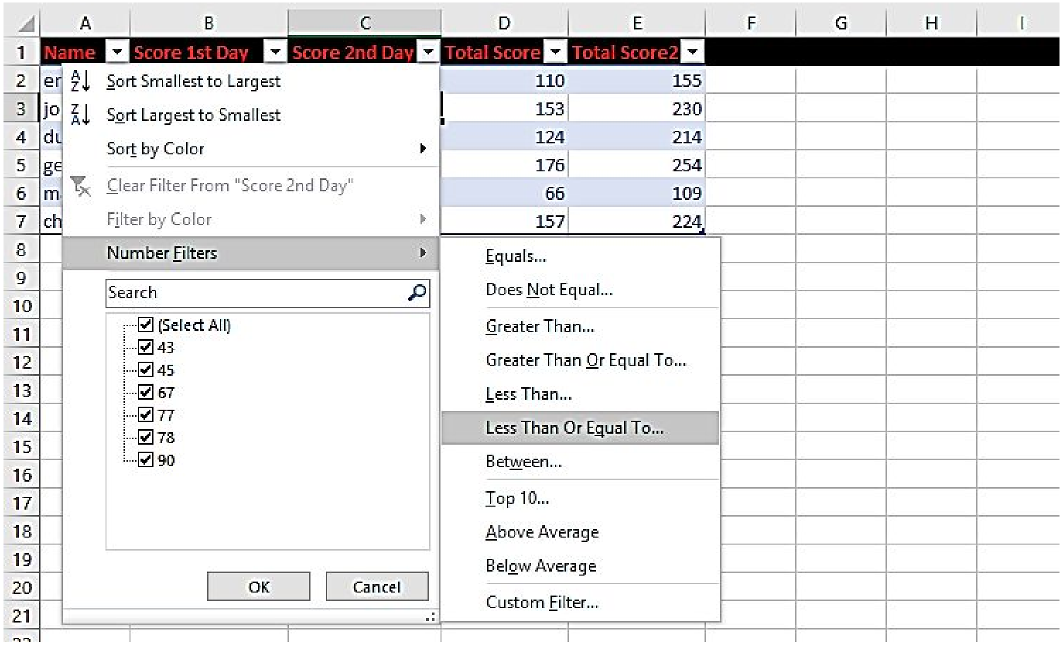


Now, click on the arrow on the column header.



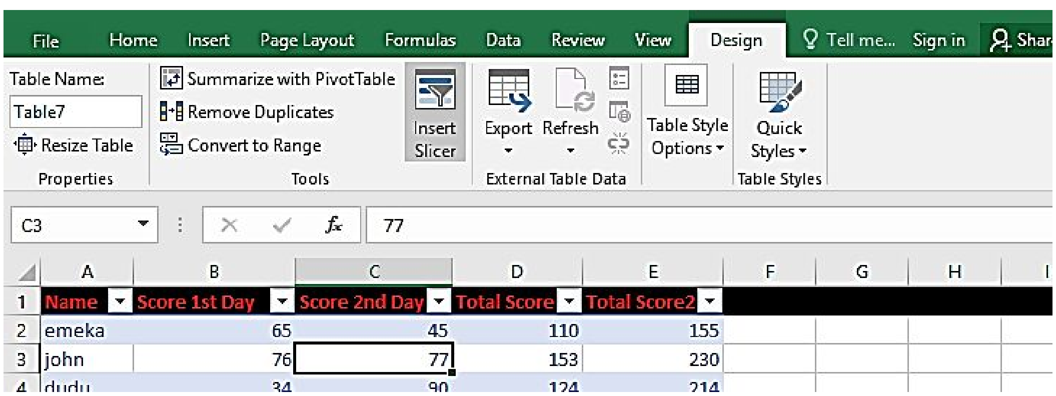
Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2
emeka	65	45	110	155
john	76	[illegible]	153	230
dudu	34	90	124	214
getar	98	78	176	254
mark	23	43	66	109
chibu	90	67	157	224

Then, click on Number Filters. Select any filter option.

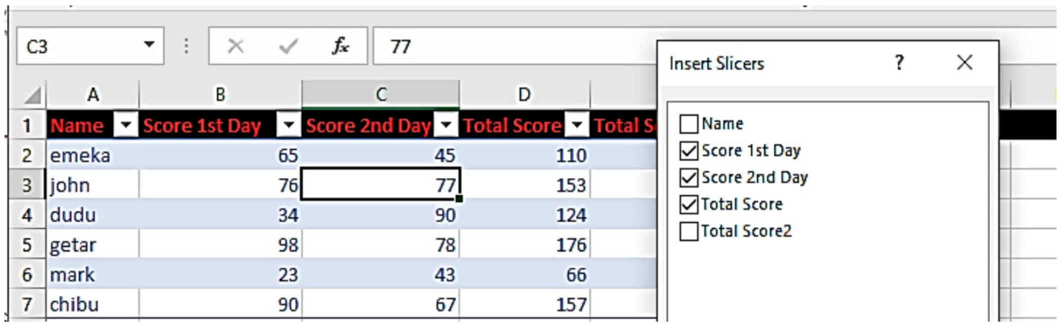


Filtering a table with slicers

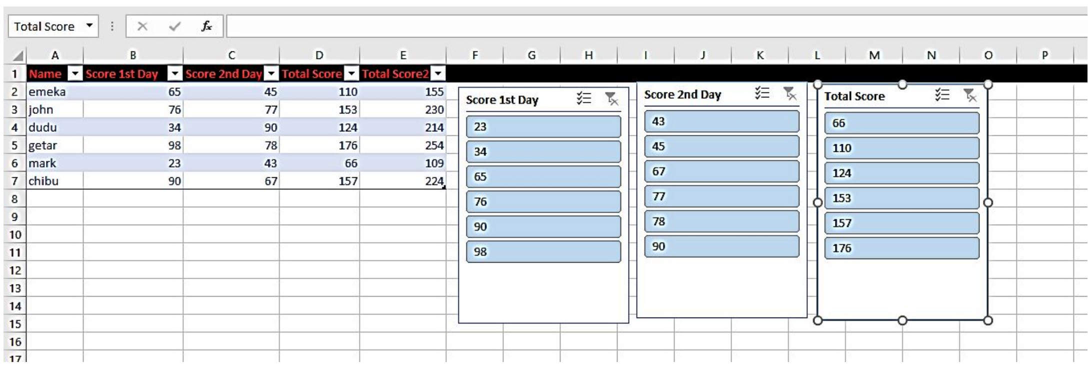
Adding Slicer filters to your tables may dramatically boost the usability of tables by allowing you to filter table data more quickly and simply. Choose the table for filtering. Then, click on Insert Slicer. You can find the Insert Slicer on the Design tab on the ribbon.



When you click on Insert Slicer, it opens up a dialog box. On it, you are to check the boxes of the field in the table in which you want to filter with a slicer.



Then, click Ok.

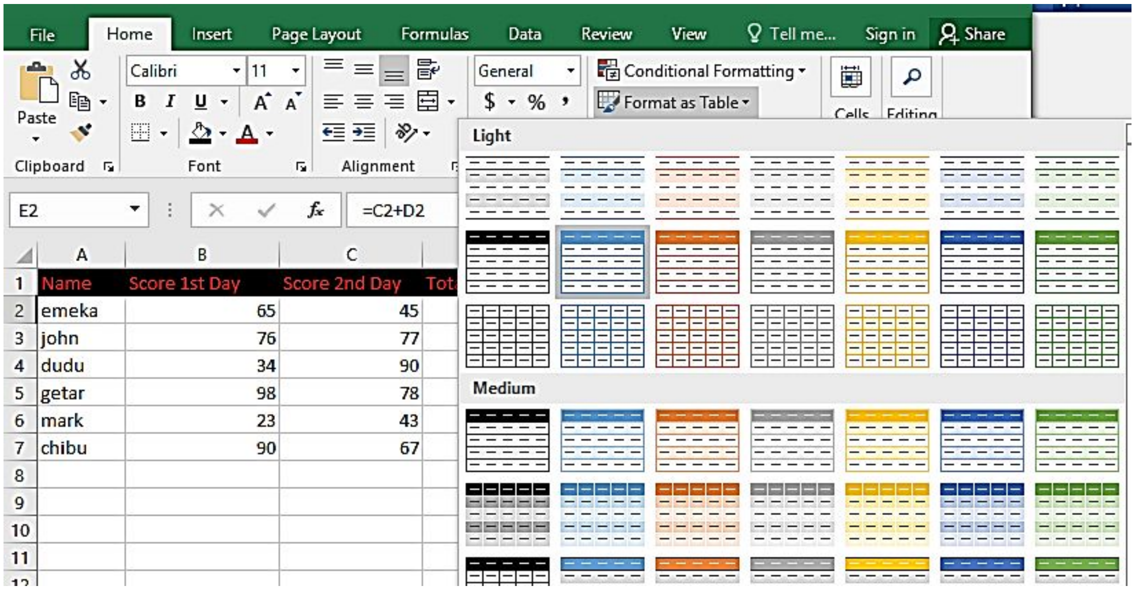


Tables are among Excel's most powerful features, but when you add Slicer filters to them, you significantly increase their use by allowing you and your team to swiftly filter tables without having to utilize the typical drop-down filter environment.

Changing the table’s appearance

What's the first thing you'd want to do with an Excel table once you've generated it? Make it appear just how you want it to!

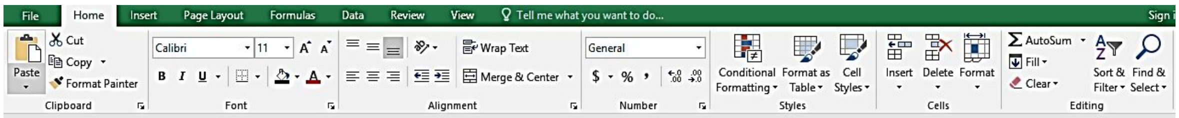
To do this, simply select the table, click on the **Home** tab, then click on **Format as Table**. This will display a menu that consists of some table styles. Choose a style.


File
Home
Insert
Page Layout
Formulas
Data
Review
View
Tell me...
Sign in
Share
Paste
Calibri
11
General
Conditional Formatting
Format as Table
Cells
Editing
Clipboard
Font
Alignment
Light
Medium
E2
=C2+D2
Name
Score 1st Day
Score 2nd Day
Tot
emeka 65 45
john 76 77
dudu 34 90
getar 98 78
mark 23 43
chibu 90 67

CHAPTER FIVE

FORMATTING WORKSHEETS

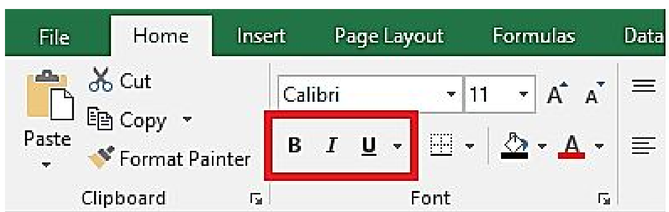
GETTING TO KNOW THE FORMATTING TOOLS



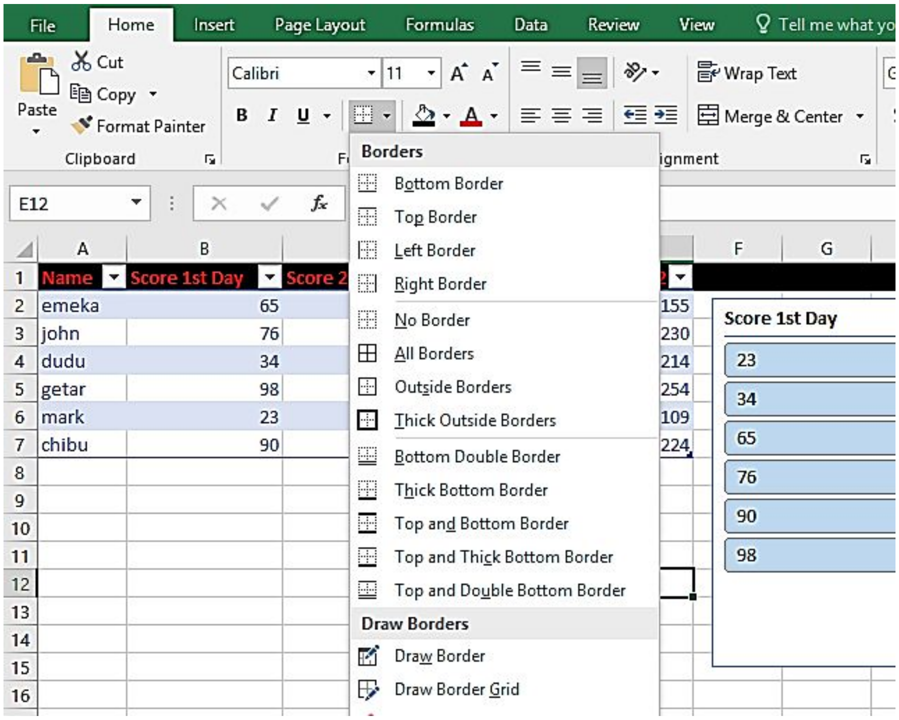
Using the formatting tools on the Home tab

When you're thinking about how to design a spreadsheet, it's helpful to know what tools you have at your disposal. What tools alter the appearance of a worksheet?

Italic, Underline, and Bold: These three tools are fundamental options. You see them almost in any text editing tool. Just highlight the text or sentences and click on any of these tools.

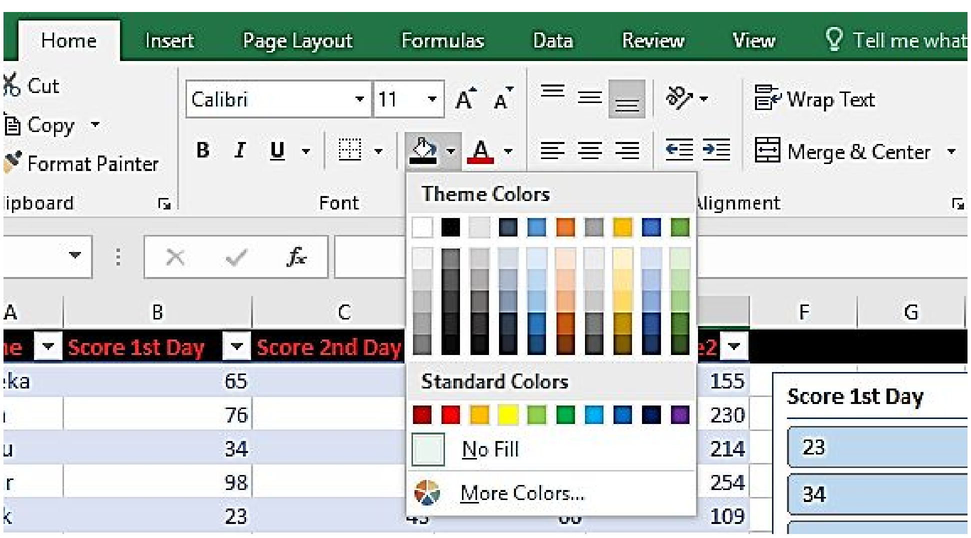


Borders: Borders are useful for segmenting your data and separating it from other portions in your worksheet. The border tool in Excel can create a variety of borders, but it might be difficult to use at first. Begin by highlighting the cells to which you wish to apply a border. Select one of the built-in styles from the Borders dropdown menu.



Shading: Shading, commonly known as **fill**, is a color applied to the cell's backdrop. To apply shading to a cell, click and highlight the cells you wish to shade.

Then, on the Font tab of the Home ribbon, click the arrow next to the paint bucket option. To apply a color to a cell, choose one of the several color thumbnails. I'll also utilize the **More Colors** option to launch a full-featured color choosing window regularly. The easiest way to make writing legible is to use light tones.



You may use shading to emphasize important data once again. One suggestion is to utilize a constant fill depending on the data of the cell, such as blue for every "input" field where you manually enter data, as I indicated previously.

Don't go overboard with the shading. When you apply too many of these to your cells, it detracts from the information provided in the spreadsheet.

Alignment: How the contents of a cell are aligned to the edges is referred to as alignment. Text may be aligned to the left, center, or right. In a cell, content is left-aligned by default. When working with huge data sets, you may wish to experiment with alignment to improve readability.

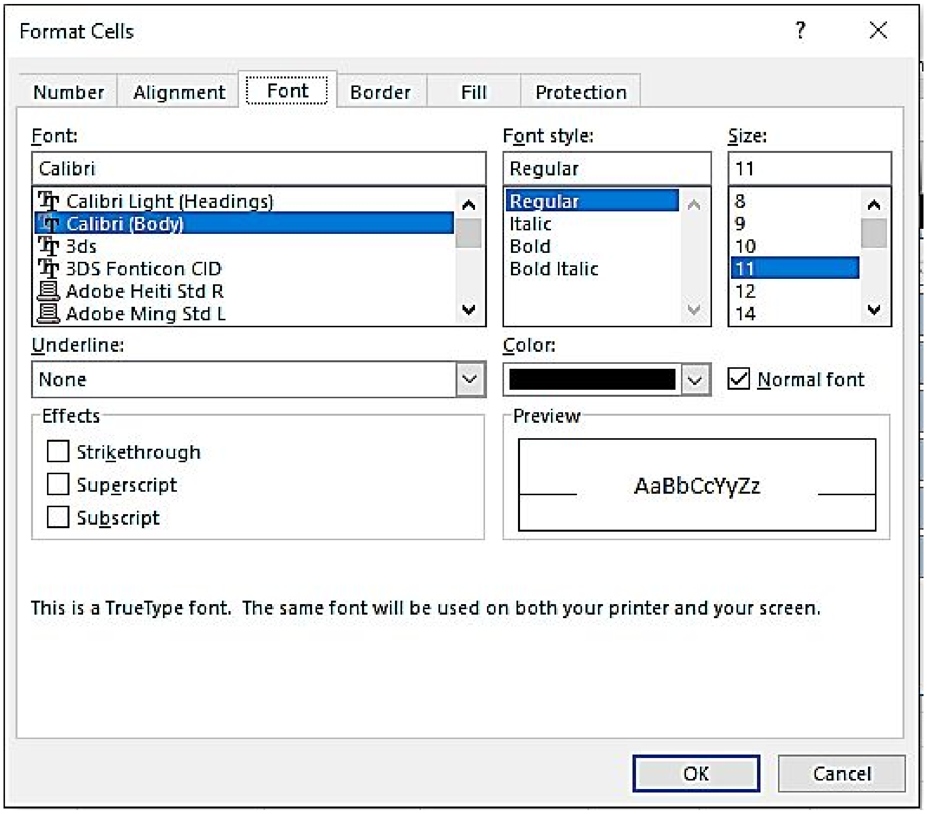
Text on the left border of a cell is a regular change I make, whereas numeric quantities should be right-aligned. Also, when column headings are centered at the top, they look fantastic.

The three alignment buttons on the Alignment tab of Excel's Home ribbon may be used to change alignment. You may also modify whether the content aligns towards the top, middle, or bottom of the cell by aligning it vertically.

Using the Format Cells dialog box

When formatting a cell value from General to Number, Accounting, Currency, etc., Format Cells is mostly used to do this. Format Cells allow us to modify the formatting of a cell number without affecting the actual number. We may modify the quantity, alignment, font style, Border style, Fill options, and Protection in Format cells.

Also, use **Control key + 1** to open it. You can also use the **Shift key + F10** as well as right-clicking on the cell you want to format and select Format Cells. On the Format Cell box, you will see six tabs which are **Number, Font, Border, Fills, Protection, and Alignment.**



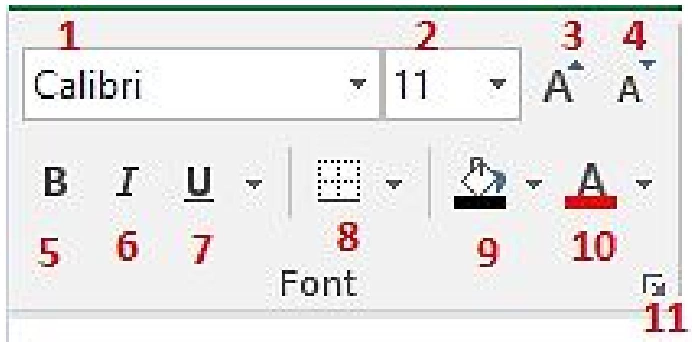
Simply select the cell or range. Press the shortcut keys listed above, open the box, and then click on any of the tabs depending on your format style. Once you are done, click Ok.

Formatting your worksheets

Worksheets are often dismissed as dull, utilitarian tools. They are, without a doubt, quite helpful for organizing data and doing computations. That doesn't mean we can't add some flair to our spreadsheets with some Excel styling.

When we format a worksheet correctly, it gives a second layer of significance to it. Formatting isn't a haphazard process; it's a technique of applying certain styles to indicate the kind of data in a cell.

Using fonts to format your worksheet



1. **Font** — Changes the font of the currently selected cell (s). Fonts are several methods of displaying the same letters.

2. **Font Size** – Controls the text size (the font). Font size is proportional to the size of the number. In this box, you may write a custom size. You may use the numbers 1 through 409 in Excel, including half sizes.

3. **Change Font Size** – Increases the font size.

4. **Reduce Font** – Reduces the font size.

5. **Bold** – Highlights the chosen cell(s). Control key +-B and Control key +-2 are shortcut keys.

6. **Italic** – Italicizes the chosen cell(s). Control key +-I and Control key +-3 are shortcut keys.

7. **Underline** — Highlights the chosen cell(s). Control key +-U and Control key +-4 are shortcut keys.

8. **Borders** – For the specified cell, add and remove borders (s). The down arrow will bring up a large list of border options. Click **More Borders**... for more border options.

9. **Fill Color** – Changes cell background color. The cells have "**No Fill**" by default.

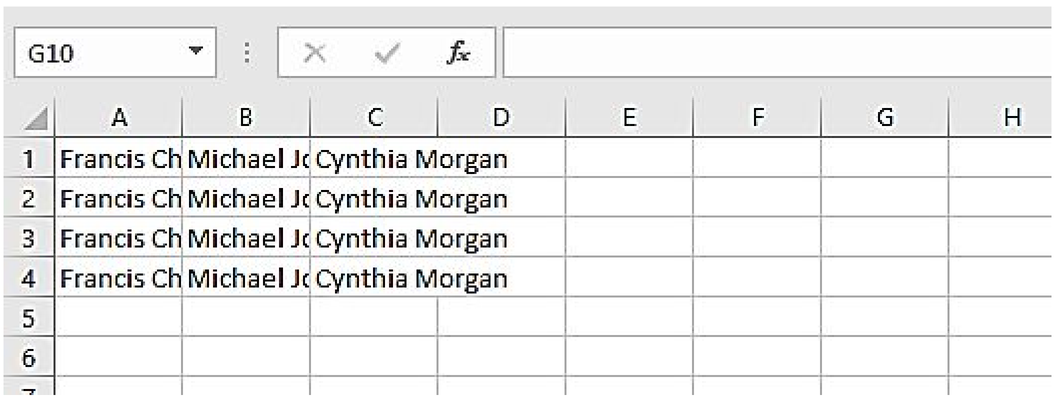
10. **Font Color** — Modifies the font color

11. **Format Cells** — This button brings up the dialog box.

Wrapping or Shrinking text to fit the cell

When text does not fit inside a cell and overflows to nearby cells, or even when text extends to the next cell, this is one of the problems encountered by Excel users.

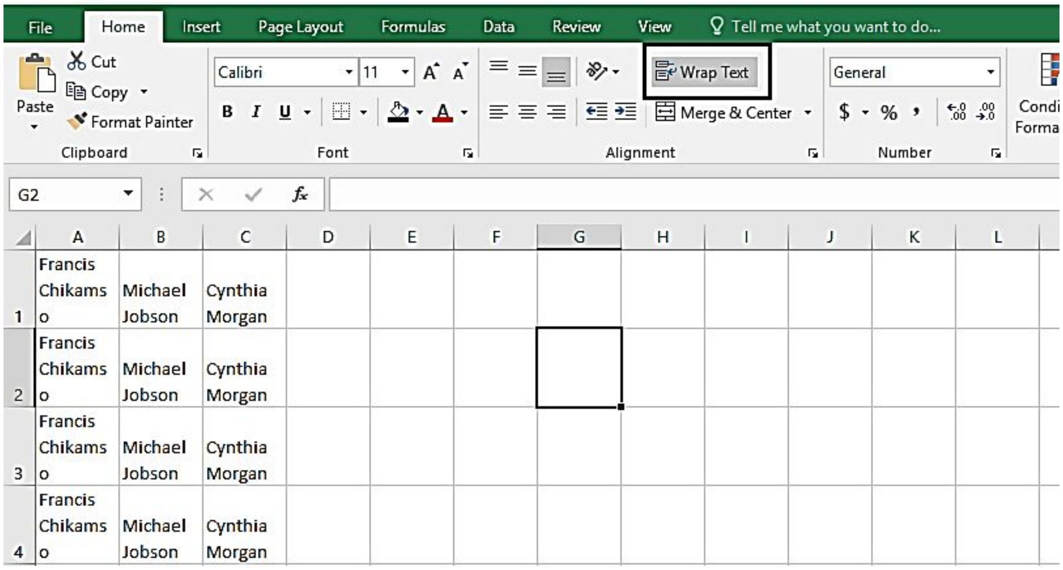
Furthermore, when there is material in the neighboring column, Text is sometimes cut-off. Because of the column's narrow width, all of the contents of the cells are not visible in the image below, however, you may always change the width. You'll also come across hyperlinks that don't fit in the cell.



Purpose of Wrap Text

Wrap Text ensures that all of the texts in a cell remain inside the cell's bounds, ensuring that all of the cell's contents are visible to readers. So, to do this, simply

Click on the Cell(s) or Range. On the Home tab, on the Alignment group, click on the Wrap Text option.



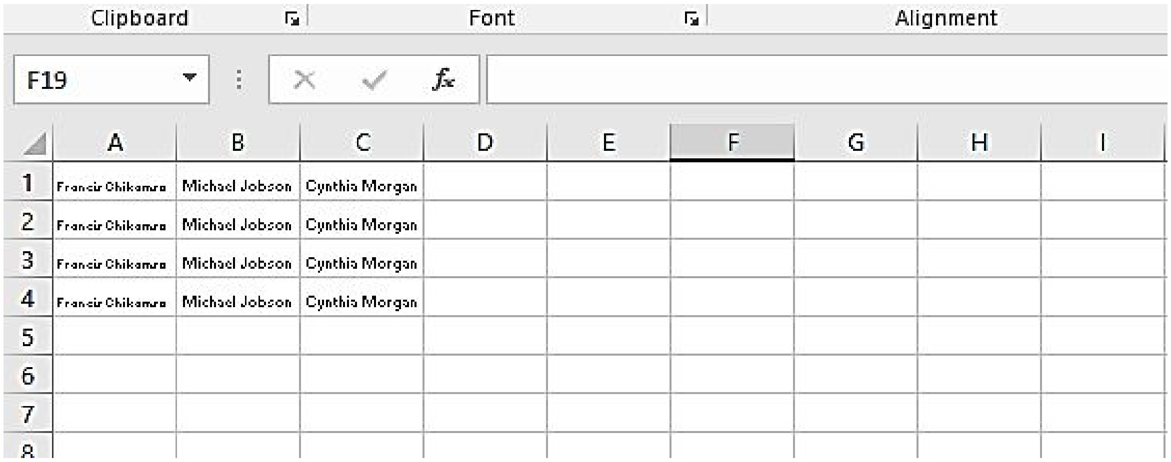
The breadth of the cell remains constant, but the cell is made taller than previously to ensure that all contents are contained inside the body of cells. As a consequence of this operation, the text in Excel will move down rather than across.

Shrinking text

Consider the case when you don't want to raise the cell size horizontally or vertically to fit the text inside the cell boundaries. You may utilize Excel's **'Shrink the text'** option in such cases. To use this, the first thing you are to do is to unwrap the text you have wrapped. Select the cell and click on **Wrap Text**.

Right-click on the cell or range.

Click on **Format Cell**. On the Alignment, tab selects the box **Shrink to fit**.

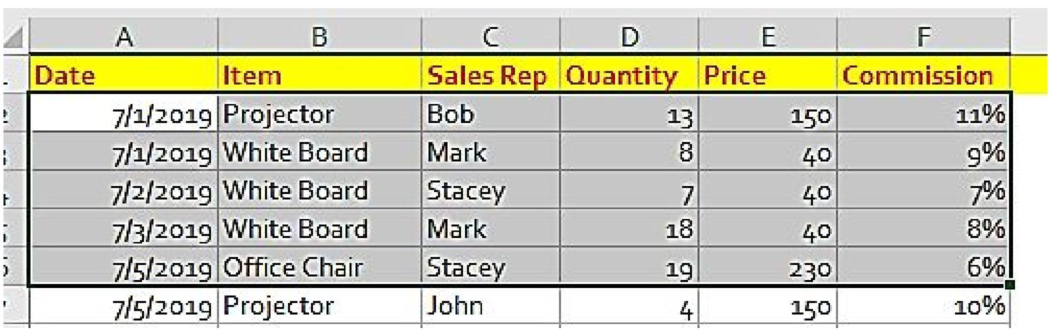


	A	B	C
1	Francis Chikamra	Michael Jobson	Cynthia Morgan
2	Francis Chikamra	Michael Jobson	Cynthia Morgan
3	Francis Chikamra	Michael Jobson	Cynthia Morgan
4	Francis Chikamra	Michael Jobson	Cynthia Morgan

Do you notice how the type size of the contents in the cell changed? This effect will not affect the cell boundaries; width and height of the cell.

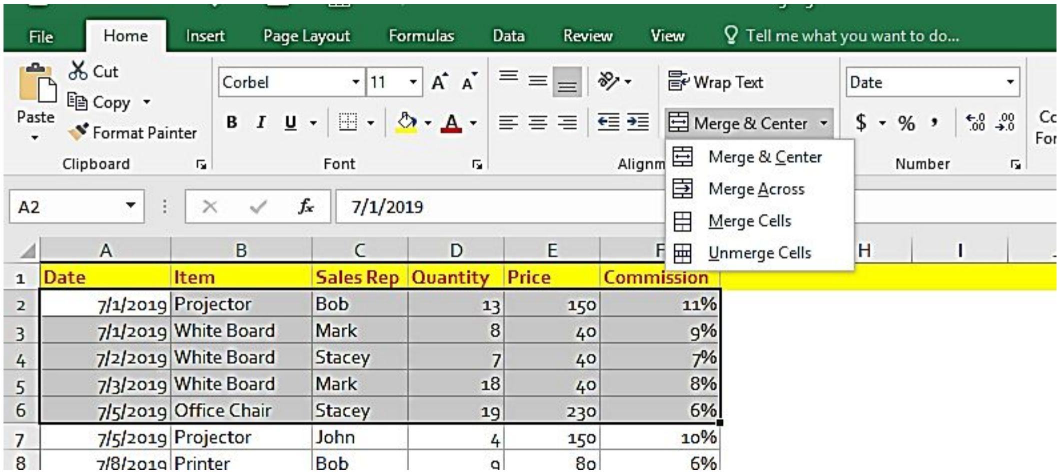
Merging worksheet cells to create additional text space

Once you have opened your worksheet, choose the cells for merging.



Date	Item	Sales Rep	Quantity	Price	Commission
7/1/2019	Projector	Bob	13	150	11%
7/1/2019	White Board	Mark	8	40	9%
7/2/2019	White Board	Stacey	7	40	7%
7/3/2019	White Board	Mark	18	40	8%
7/5/2019	Office Chair	Stacey	19	230	6%
7/5/2019	Projector	John	4	150	10%

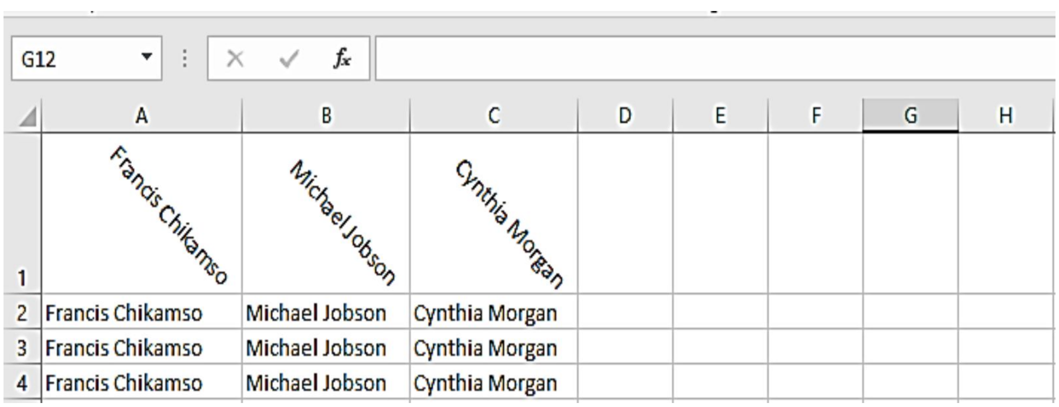
Select **Merge & Center** on the Home tab. This will merge the cells and will center the content. Click the down arrow on the **Merge & Center** option to see other merging options.



Displaying text at an angle

Using an angle for your text, particularly for column and row headings, maybe aesthetically pleasant. You may swiftly rotate the text in either a clockwise or counterclockwise direction. Simply follow the steps below;

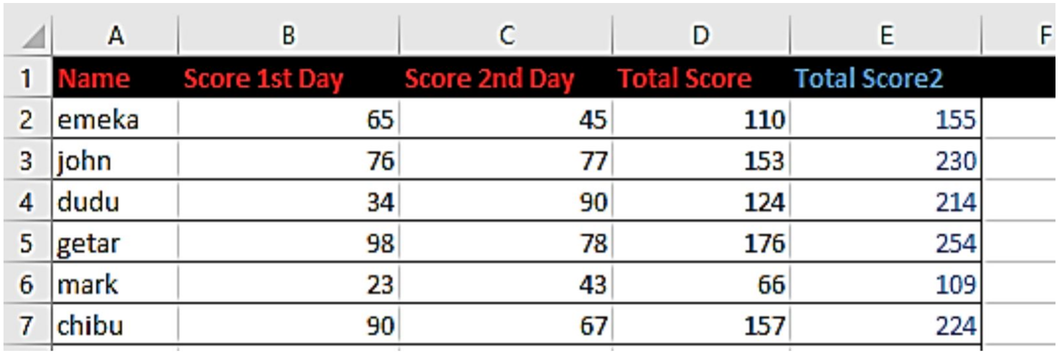
- Click on the cell or range of cells.
- Click on the down arrow near the **ab** (with an arrow below) symbol in the alignment group.
- Choose either **Angle Counterclockwise** or **Angle Clockwise** from the top two choices.



Using colors and shading

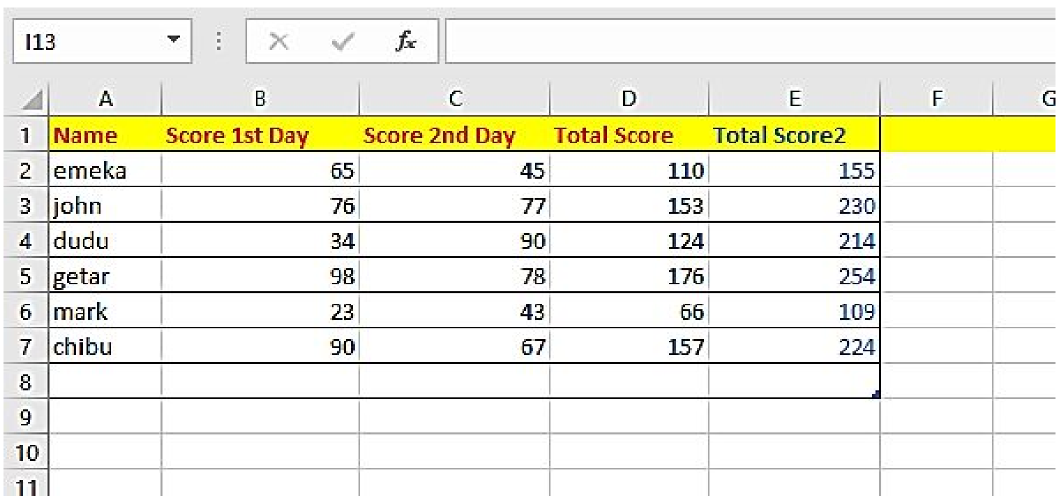
First, select the cells, then press **Control key + 1** to launch the Format Cells dialog.

Click the **Font tab.** After choosing font color, click ok. In the image below, I changed the color of the Total Score 2 column to blue.



	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2	
2	emeka	65	45	110	155	
3	john	76	77	153	230	
4	dudu	34	90	124	214	
5	getar	98	78	176	254	
6	mark	23	43	66	109	
7	chibu	90	67	157	224	

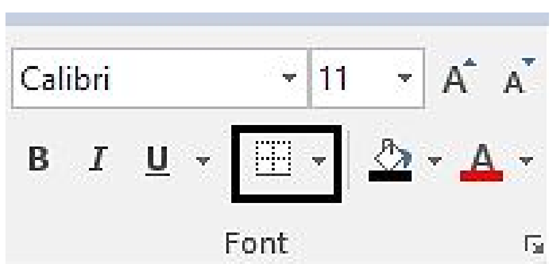
To fill the cells with color, select the desired cells. Launch the format cells dialog box. Click on the **Fill** tab and select a color, then click **Ok**. This formatting draws attention to the column headings and the data in the total score column.



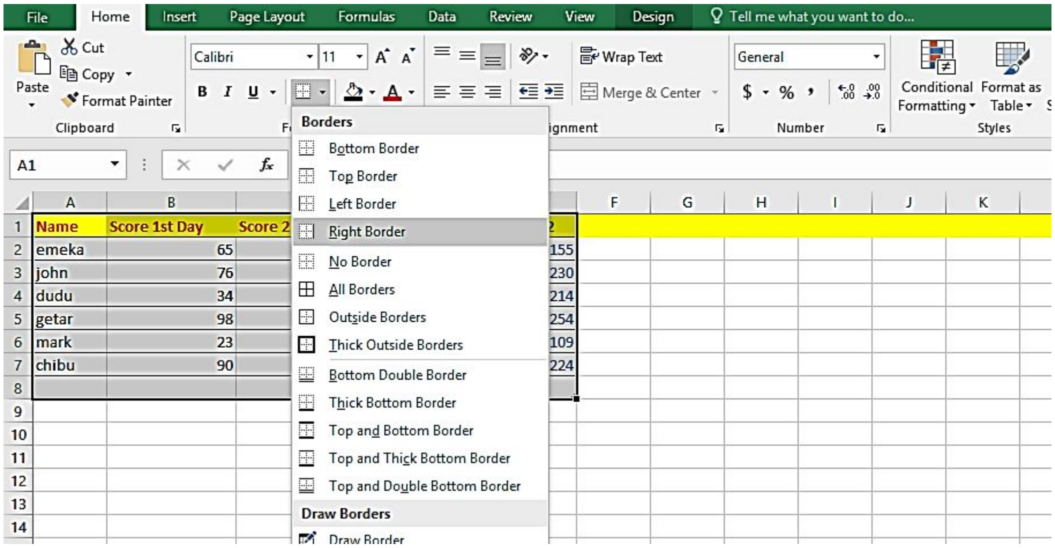
	A	B	C	D	E	F	G
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2		
2	emeka	65	45	110	155		
3	john	76	77	153	230		
4	dudu	34	90	124	214		
5	getar	98	78	176	254		
6	mark	23	43	66	109		
7	chibu	90	67	157	224		
8							
9							
10							
11							

Adding border lines

Highlight the cells. Click on the drop-down arrow.



So, select the kind of border you want to add and where you want to add it.



Using conditional formatting

In Excel, conditional formatting is used to emphasize data based on certain conditions. It would be tough to see different patterns merely by looking at your Excel worksheet. In Excel, conditional formatting allows you to visualize data and make spreadsheets more understandable. It enables you to add formatting to cell values such as colors, icons, and data bars based on the cell values.

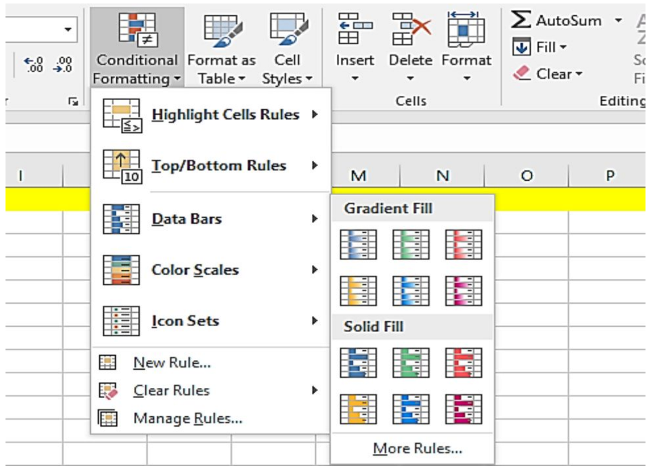
It makes it simple to scan your data and check for vital signs graphically. With numerical data, conditional formatting works best. Simply choose a column of data and make sure you're on the Home tab of Excel's ribbon to get started. From the Conditional Formatting dropdown menu, you may choose from a variety of styles. Each of the formats your cells in a different way, but they all adjust to the cells you've highlighted.

Using graphical conditional formats

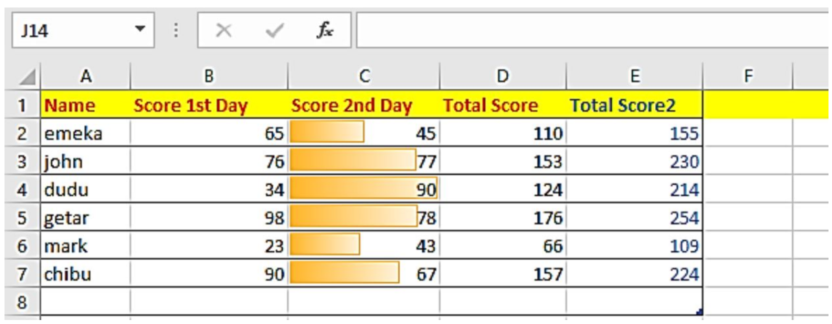
Data bars, color scales, and icon sets are the three conditional formatting choices for displaying graphics. These sorts of conditional formatting might help you see a range of numbers.

Using data bars

Horizontal bars are shown directly in the cell using the data bars conditional format. The length of the bar is determined by the cell's value in comparison to the other values in the range. To do this, simply select the column or row. Click on **Conditional formatting** and select Data bars which will display a list of different data bars for you to select from.



Pick one and the effect will be applied on your worksheet.

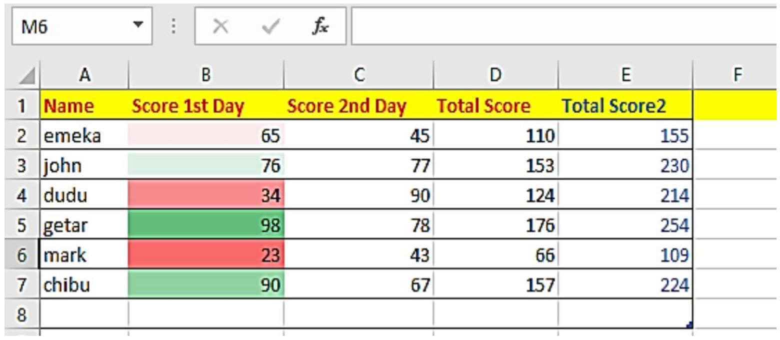


	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2	
2	emeka	65	45	110	155	
3	john	76	77	153	230	
4	dudu	34	90	124	214	
5	getar	98	78	176	254	
6	mark	23	43	66	109	
7	chibu	90	67	157	224	
8						

Surprisingly, the colors used for data bars are not theme colors if you pick one of the 12 data bar types. The data bar colors do not change when you alter the document theme. However, if you use the New Formatting Rule dialog box to add the data bars, the colors you pick are theme colors.

Using color scales

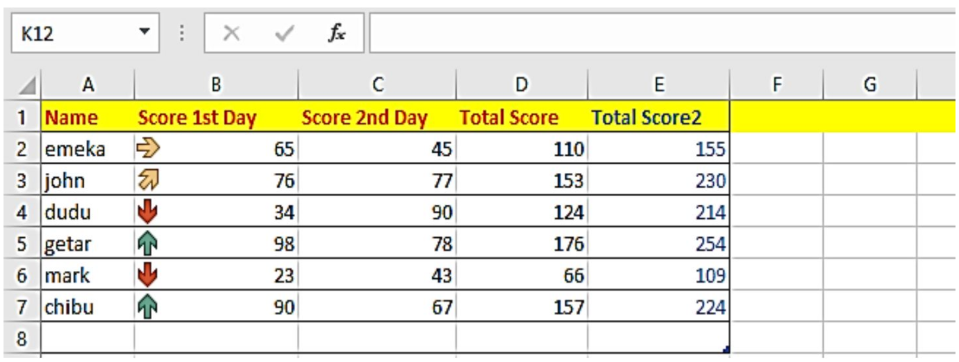
Select the column or row. Click on **Conditional formatting** and select Color Scales which will display a list of different color scales for you to select from. Select one and it will be applied to your worksheet.



	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2	
2	emeka	65	45	110	155	
3	john	76	77	153	230	
4	dudu	34	90	124	214	
5	getar	98	78	176	254	
6	mark	23	43	66	109	
7	chibu	90	67	157	224	
8						

Using icon sets

Select the column or row. Click on **Conditional formatting** and select **Icon Sets** which will display a list of different icon sets for you to select from. Select one and it will be applied to your worksheet.



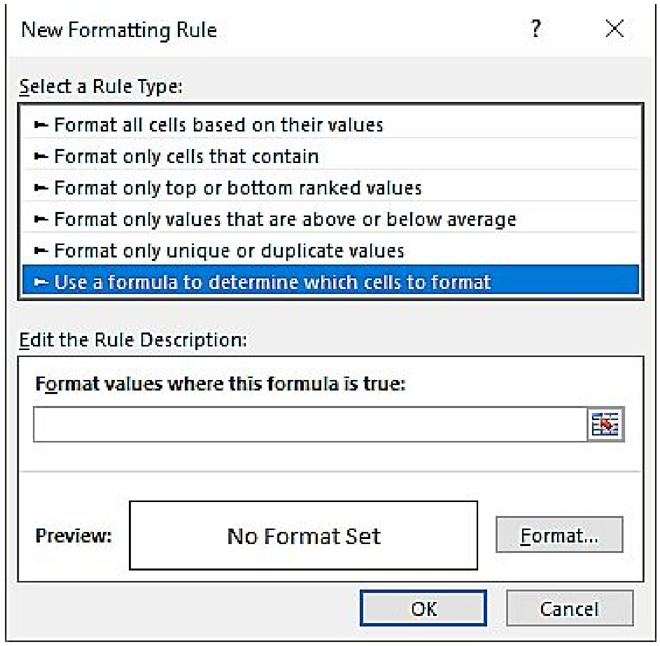
	A	B	C	D	E	F	G
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2		
2	emeka	65	45	110	155		
3	john	76	77	153	230		
4	dudu	34	90	124	214		
5	getar	98	78	176	254		
6	mark	23	43	66	109		
7	chibu	90	67	157	224		
8							

Creating formula-based rules

Formulas are a more powerful technique to apply conditional formatting since they enable you to apply rules based on any reasoning. Excel comes with a plethora of "presets" that makes it simple to establish new rules without having to use formulae.

Although Excel comes with several "presets" for conditional formatting, they are restricted. You may, however, construct rules using your unique formulae. You may take over the situation that activates a rule and apply precisely the reasoning you need by creating your formula. Formulas provide you with the greatest amount of power and versatility.

To create formula-based rules, simply choose the cells. Then, on the Home tab, click on Styles > Conditional Formatting > New Rule. This will open up the new formatting rule dialog box. Click on the **Use a formula to determine which cells to format** option, and then type in the formula.



The formula has to be logical. It must return either TRUR or FALSE. When it is true, the conditional formatting will apply but when it is false, it will not apply. Note that the formula must start with an **equal to (=)** sign.

Understanding relative and absolute references

There are several types of cell references in Excel formulas, some of which we have listed below.

Absolute cell references: (Those preceded by a $ sign, such as $A$1) are always consistent, regardless of where they are copied.

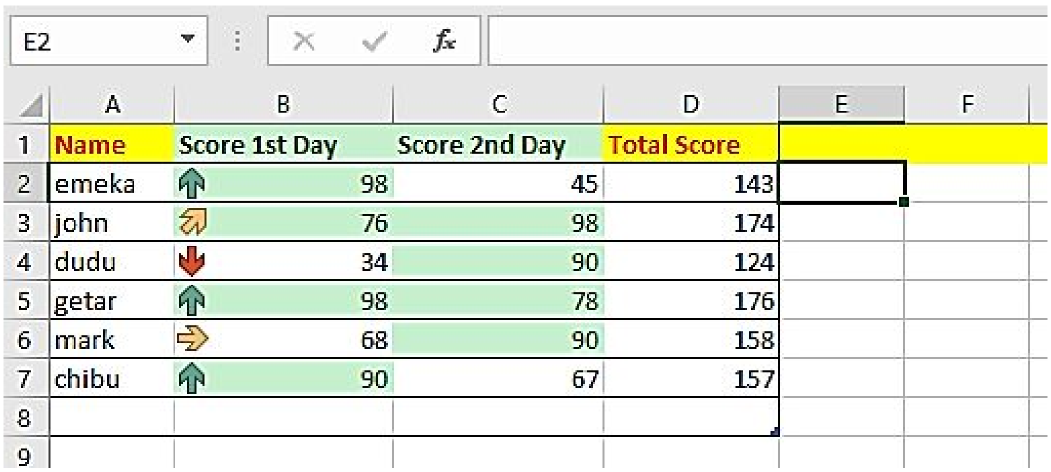
Relative cell references: (Those without the $ sign, such as A1) alter depending on the relative location of the rows and column when replicated over several cells.

Mixed cells references: This is the absolute column and relative row ($A1), or relative column and absolute row (A$1). These are mostly used in conditional formatting rules to indicate that a column letter or row number should be fixed when a rule is applied to all other cells in the chosen range.

In conditional formatting rules, cell references are tied to the specified range's top-left most cell. Simply create a formula for the top-left cell when establishing a new rule, and Excel would "**replicate**" your formula to all of the other cells in the given range.

Relative references: Every cell references are a relative reference by default. When you copy them on many cells, they will adjust depending on the relative location of the columns and rows. Now, let's create a formula and copy it using relative references.

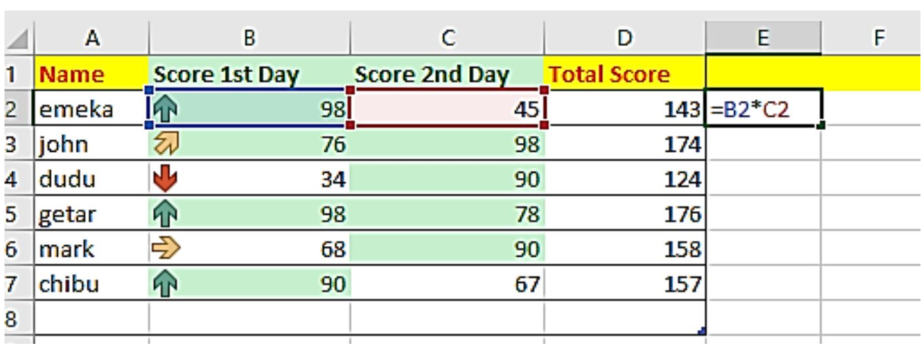
From the image below, we will create a formula that will multiply the student's score on the first day by the student's score on the second day. So, we will create the formula in cell E2. So first, select cell E2.



E2

	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score		
2	emeka	98	45	143		
3	john	76	98	174		
4	dudu	34	90	124		
5	getar	98	78	176		
6	mark	68	90	158		
7	chibu	90	67	157		
8						
9						

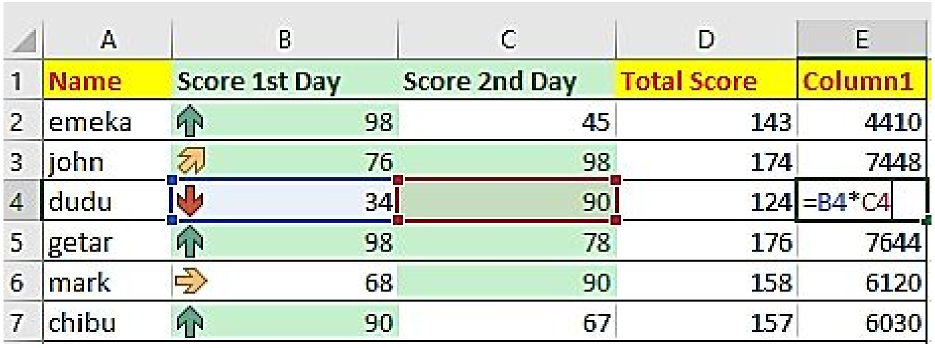
On the cell, we will put in the formula which will calculate it for us. The formula here is **=B2*C2**.



	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score		
2	emeka	98	45	143	=B2*C2	
3	john	76	98	174		
4	dudu	34	90	124		
5	getar	98	78	176		
6	mark	68	90	158		
7	chibu	90	67	157		
8						

After typing in the formula, press Enter. Now, drag the fill handle to the last cell on the column. This will copy the formula to the cells with relative references and fill in the rest of the column with the calculated answer.

When you double-click on the cells, you will see their formula. The relative cell references will differ from each other (that depends on their rows).



	A	B	C	D	E
1	Name	Score 1st Day	Score 2nd Day	Total Score	Column1
2	emeka	98	45	143	4410
3	john	76	98	174	7448
4	dudu	34	90	124	=B4*C4
5	getar	98	78	176	7644
6	mark	68	90	158	6120
7	chibu	90	67	157	6030

Absolute references

Maybe you may not want your cell reference to change when it is copied to other cells. In relative references, it changes, while absolute references don’t change when it's copied. You use this to make your row or column remain constant.

Conditional formatting formula examples

Assume you choose the range A1:B10 and want to apply formatting to any cells in the range that are greater than the value in cell C1. Fill in the following conditional formatting formula:

=A1>$C$1

The reference to cell C1 in this example is absolute; it will not be altered for the cells in the chosen range. To put it another way, the conditional formatting formula for cell A2 is as follows:

=A2>$C$1

The absolute cell reference is not changed, but the relative cell reference is.

After choosing the Use a Formula to Determine Which Cells to Format rule type, each of these examples employs a formula written directly into the New Formatting Rule dialog box. You get to choose the sort of conditional formatting you want to use.

Identifying weekend days

Although Excel has a variety of conditional formatting rules for dates, it does not allow you to identify dates that fall on a weekend. To get weekend dates, use the following formula:

=OR(WEEKDAY(A1)=7,WEEKDAY(A1)=1)

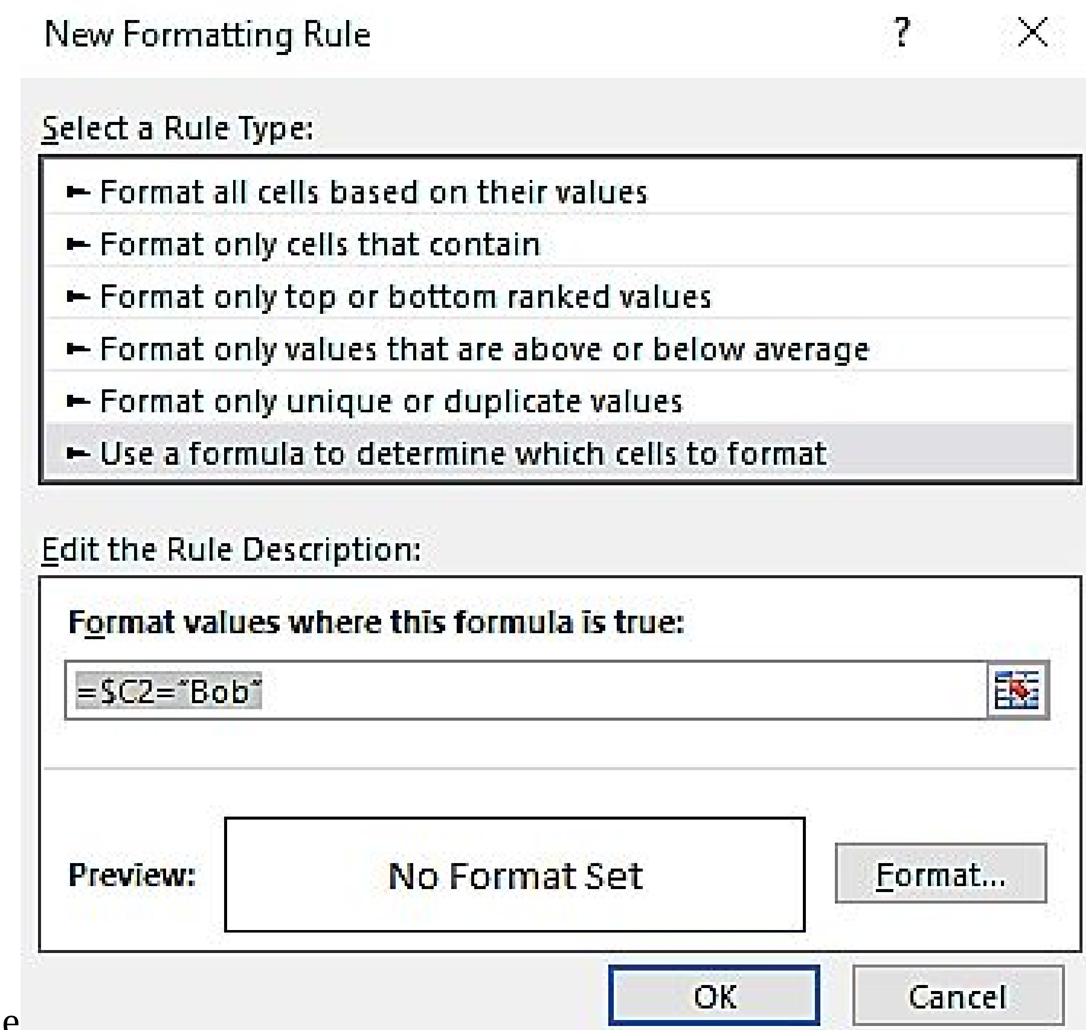
This formula supposes that you've chosen a range and the active cell here is cell A1

Highlighting a row based on a value

In my example below, I want to highlight the records that contain everything about Bob.

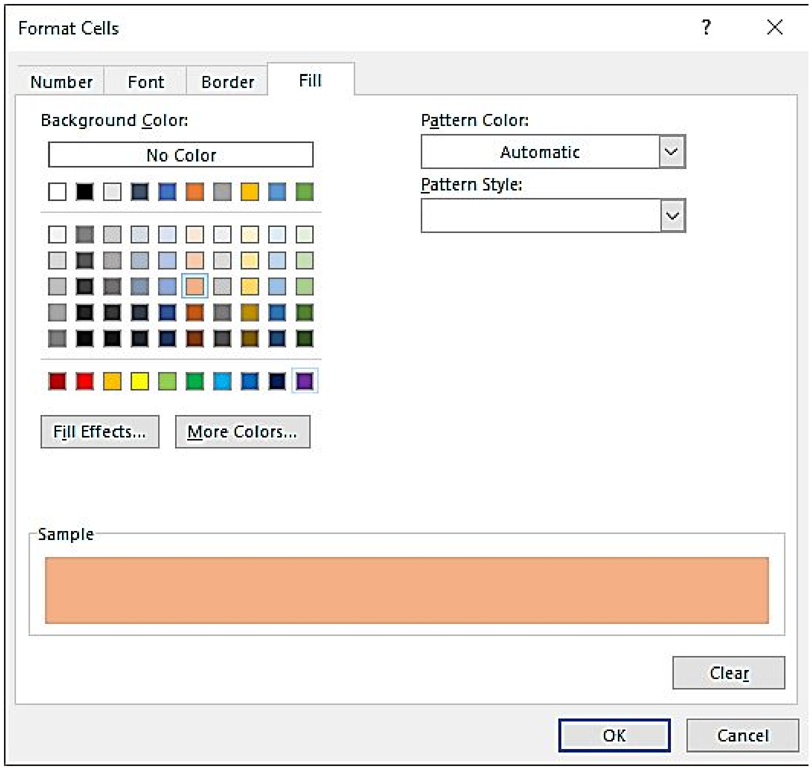
	A	B	C	D	E	F
1	Date	Item	Sales Rep	Quantity	Price	Commission
2	7/1/2019	Projector	Bob	13	150	11%
3	7/1/2019	White Board	Mark	8	40	9%
4	7/2/2019	White Board	Stacey	7	40	7%
5	7/3/2019	White Board	Mark	18	40	8%
6	7/5/2019	Office Chair	Stacey	19	230	6%
7	7/5/2019	Projector	John	4	150	10%
8	7/8/2019	Printer	Bob	9	80	6%
9	7/10/2019	Printer	Laura	16	80	2%
10	7/10/2019	Office Chair	Mark	15	230	9%
11	7/10/2019	Diary	Bob	15	16	1%
12	7/10/2019	Office Chair	John	7	230	2%
13	7/13/2019	Diary	Laura	23	16	11%
14	7/17/2019	White Board	Bob	20	40	5%
15	7/17/2019	Office Chair	Mark	9	230	3%
16	7/20/2019	White Board	Stacey	23	40	6%
17	7/20/2019	White Board	Stacey	4	40	5%

So, I highlight the entire worksheet, select Conditional Formatting (Home tab) and select New rules. Choose the **“Use a formula to determine which cells to format”** option. On the box, below it, type in this formula **=$C2=” Bob”**



e

Then, click on the Format option. Click on the Fill tab and choose a color that you want it to be highlighted with. Then, click Ok.



This will be the result.

Date	Item	Sales Rep	Quantity	Price	Commission
7/1/2018	Projector	Bob	13	150	11%
7/1/2018	White Board	Mark	8	40	9%
7/2/2018	White Board	Stacey	7	40	7%
7/3/2018	White Board	Mark	18	40	8%
7/5/2018	Office Chair	Stacey	19	230	6%
7/5/2018	Projector	John	4	150	10%
7/8/2018	Printer	Bob	9	80	6%
7/10/2018	Printer	Laura	16	80	2%
7/10/2018	Office Chair	Mark	15	230	9%
7/10/2018	Diary	Bob	15	16	1%
7/10/2018	Office Chair	John	7	230	2%
7/13/2018	Diary	Laura	23	16	11%
7/17/2018	White Board	Bob	20	40	5%
7/17/2018	Office Chair	Mark	9	230	3%
7/20/2018	White Board	Stacey	23	40	6%
7/20/2018	White Board	Stacey	4	40	5%

Explanation

Conditional Formatting examines each cell for the condition we've set, which is =$C2=" Bob" in this case. As a result, it will check whether cell

C2 contains the name Bob or not while inspecting each cell in row A2. If it does, that cell is highlighted; if it does not, it is not.

It's important to note that the dollar symbol ($) comes before the column alphabet ($C1). By doing so, we've ensured that the column will always be C. When cell A2 is tested for the formula, it will also check cell C2, and when cell A3 is examined for the condition, it will also check cell C3. By using conditional formatting, we can highlight the whole row.

Displaying alternate-row shading

Pick a range. Click on Conditional Formatting and select New Rule.

Date	Item	Sales Rep	Quantity	Price	Commission
7/1/2019	Projector	Bob	13	150	11%
7/1/2019	White Board	Mark	8	40	9%
7/2/2019	White Board	Stacey	7	40	7%
7/3/2019	White Board	Mark	18	40	8%
7/5/2019	Office Chair	Stacey	19	230	6%
7/5/2019	Projector	John	4	150	10%
7/8/2019	Printer	Bob	9	80	6%
7/10/2019	Printer	Laura	16	80	2%
7/10/2019	Office Chair	Mark	15	230	9%
7/10/2019	Diary	Bob	15	16	1%
7/10/2019	Office Chair	John	7	230	2%
7/13/2019	Diary	Laura	23	16	11%

Click on “Use a formula to determine which cells to format”

Type =**MOD(ROW(),2).**

Click **Format** to choose a style. Click Ok.

	A	B	C	D	E	F
1	Date	Item	Sales Rep	Quantity	Price	Commission
2	7/1/2019	Projector	Bob	13	150	11%
3	7/1/2019	White Board	Mark	8	40	9%
4	7/2/2019	White Board	Stacey	7	40	7%
5	7/3/2019	White Board	Mark	18	40	8%
6	7/5/2019	Office Chair	Stacey	19	230	6%
7	7/5/2019	Projector	John	4	150	10%
8	7/8/2019	Printer	Bob	9	80	6%
9	7/10/2019	Printer	Laura	16	80	2%
10	7/10/2019	Office Chair	Mark	15	230	9%
11	7/10/2019	Diary	Bob	15	16	1%
12	7/10/2019	Office Chair	John	7	230	2%
13	7/13/2019	Diary	Laura	23	16	11%
14	7/17/2019	White Board	Bob	20	40	5%
15	7/17/2019	Office Chair	Mark	9	230	3%

How does it work?

The residual of a division is returned by the MOD function. The ROW() method returns the number of rows in a table. For instance, MOD(7,2) = 1 for the seventh row since 7 divided by 2 equals 3 with a leftover of 1. MOD(8,2) = 0 for the eighth row since 8 divided by 2 equals 4 with a residual of 0. As a consequence, all odd rows will be darkened if they return 1 (TRUE).

Creating checkerboard shading

First, choose a range of cells and follow the steps above. On the formula box, type in this formula **=MOD(ROW(),2) =MOD(COLUMN(),2).** Click on Format and select a color. Click Ok.

	A	B	C	D	E	F
1	Date	Item	Sales Rep	Quantity	Price	Commission
2	7/1/2019	Projector	Bob	13	150	11%
3	7/1/2019	White Board	Mark	8	40	9%
4	7/2/2019	White Board	Stacey	7	40	7%
5	7/3/2019	White Board	Mark	18	40	8%
6	7/5/2019	Office Chair	Stacey	19	230	6%
7	7/5/2019	Projector	John	4	150	10%
8	7/8/2019	Printer	Bob	9	80	6%
9	7/10/2019	Printer	Laura	16	80	2%
10	7/10/2019	Office Chair	Mark	15	230	9%
11	7/10/2019	Diary	Bob	15	16	1%
12	7/10/2019	Office Chair	John	7	230	2%
13	7/13/2019	Diary	Laura	23	16	11%
14	7/17/2019	White Board	Bob	20	40	5%

Shading groups of rows

To shade rows in excel, formulas to be used will be based on CEILING, ROWS, and **ISEVEN**. The formula for it is **=ISEVEN(CEILING(ROW() –offset, n)/n).**

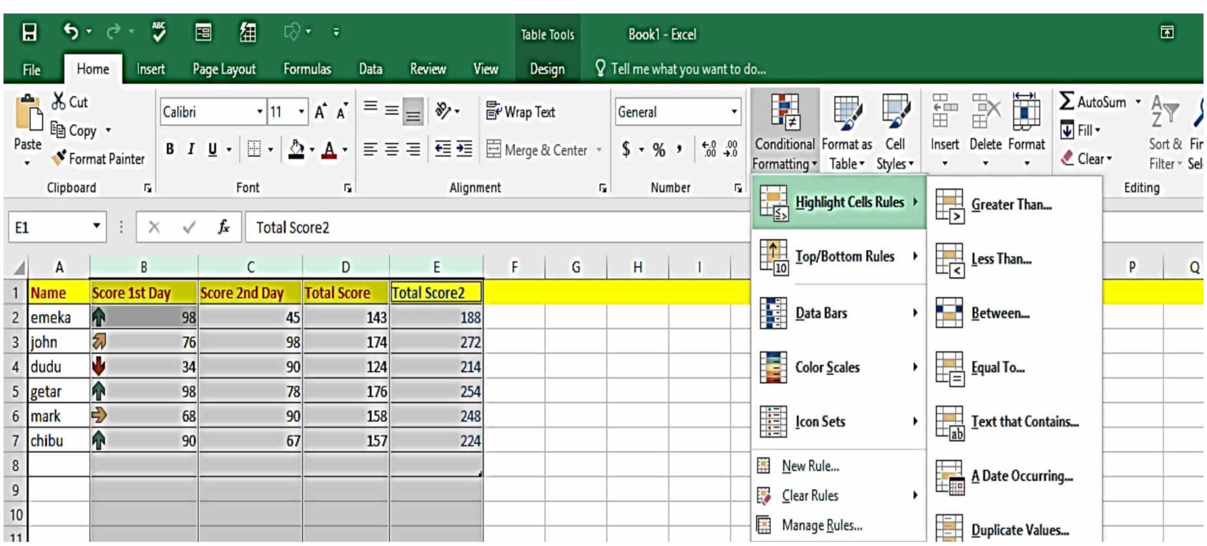
- **n** stands for the number of rows in a group
- offset stands for the number used to normalize the first row.
- So to shade group pf rows, simply follow the steps above and on the formula box, type in this formula **=ISODD(CEILING(ROW) -5,3)/3).**

Working with Conditional formats

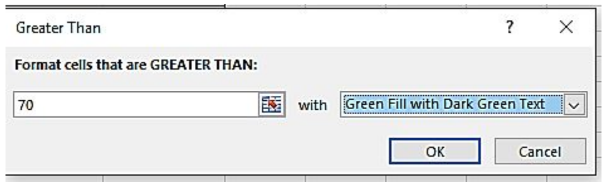
We'll go through the basics of building a new conditional formatting rule in the example below. Although there are several forms of conditional formatting, the core processes are the same for all of them. Let's have a look at what we've got.

In the image below is a table that consists of the scores of a group of students. Now, we will create a conditional formatting rule which will highlight the test scores that are over 70. We will make it highlight it with the green color. To do this, follow the steps below;

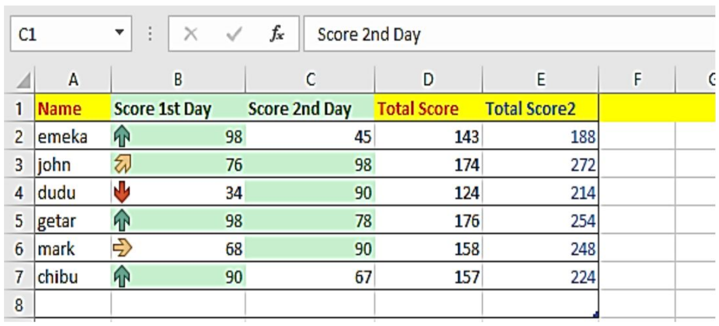
First, choose the cells you want to format. On the Home tab, click on **Conditional formatting**. From the list of options there, click on the **Highlight Cells Rules**, then select **Greater Than.**



Type in 70 and select the green color. Click Ok.

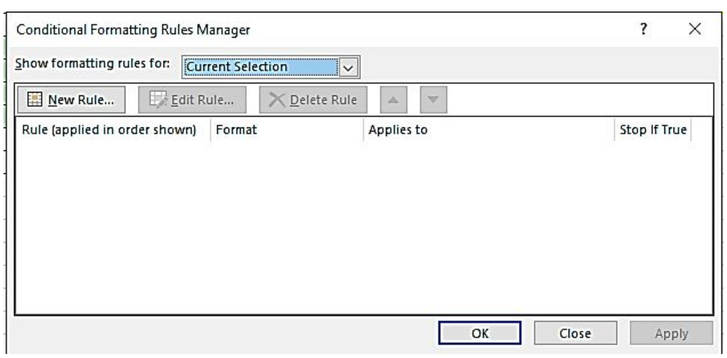


After you have clicked Ok, the rule will be created and you will see the result on your worksheet.

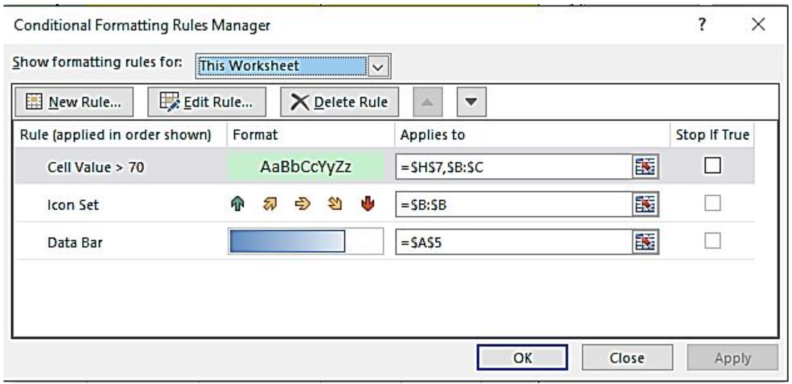


	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2	
2	emeka	98	45	143	188	
3	john	76	98	174	272	
4	dudu	34	90	124	214	
5	getar	98	78	176	254	
6	mark	68	90	158	248	
7	chibu	90	67	157	224	
8						

To access the conditional formatting rule, which you have created, click on **Manage Rules** on the conditional formatting menu. if the selection has cells that have conditional formatting applied to it, the rule will display in the Rules Manager window.



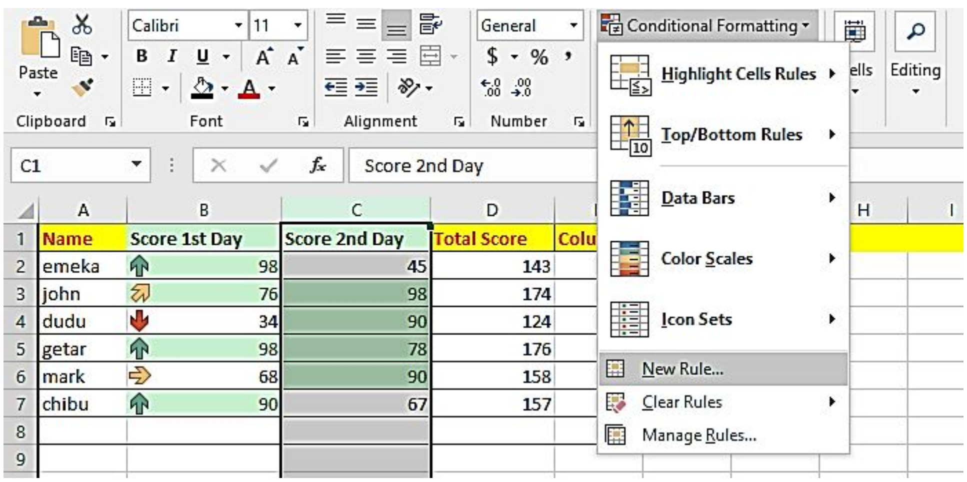
But if the current selection has no cells which have conditional formatting applied to it, then, the rules will not display. So, to make it display, click on the drop-down arrow on the "**Show formatting rules for"** option and select "**This Worksheet**". It will display all the rules and conditional formatting you have applied to that worksheet.



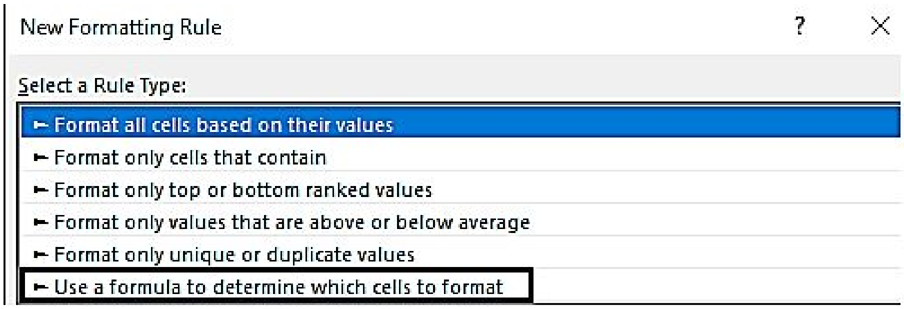
You may use the following steps to develop an excel formula for conditional formatting:

- Select cells or columns to format. If you wish to apply formatting to an entire row, however, you may pick numerous columns or the whole table. More data may be added by transforming cells into tables using the Insert tab and then choosing some empty rows below one's data.

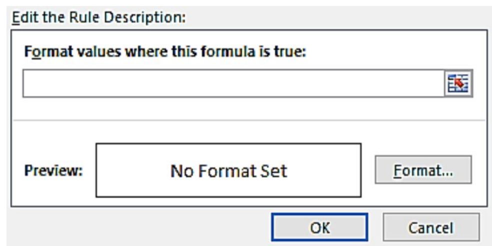
- Select New Rule from the Conditional Formatting menu.



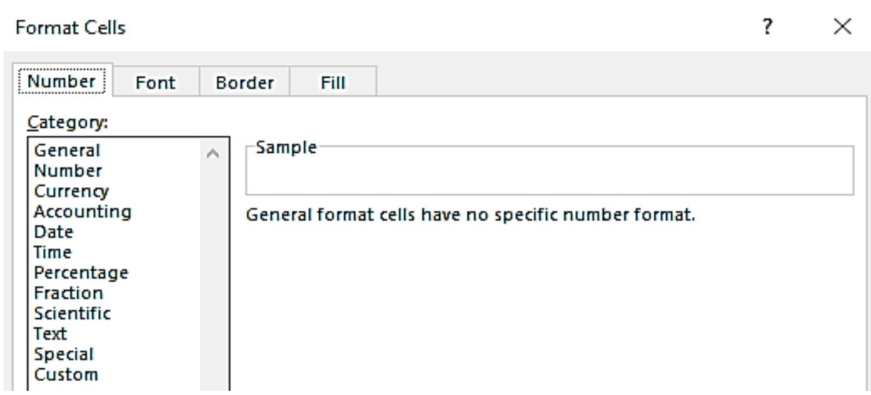
- Select Use a formula tab to decide which cells to format under New Formatting Rule.



- The formula may then be typed in the appropriate area. Pick the Format option to select a custom format.



- The Font, Border, and Fill tabs may be switched to experiment with choices such as font, style, and fill color. Under the More Colors option, one may also choose a chosen color from the RGB or HSL charts and then click Ok.



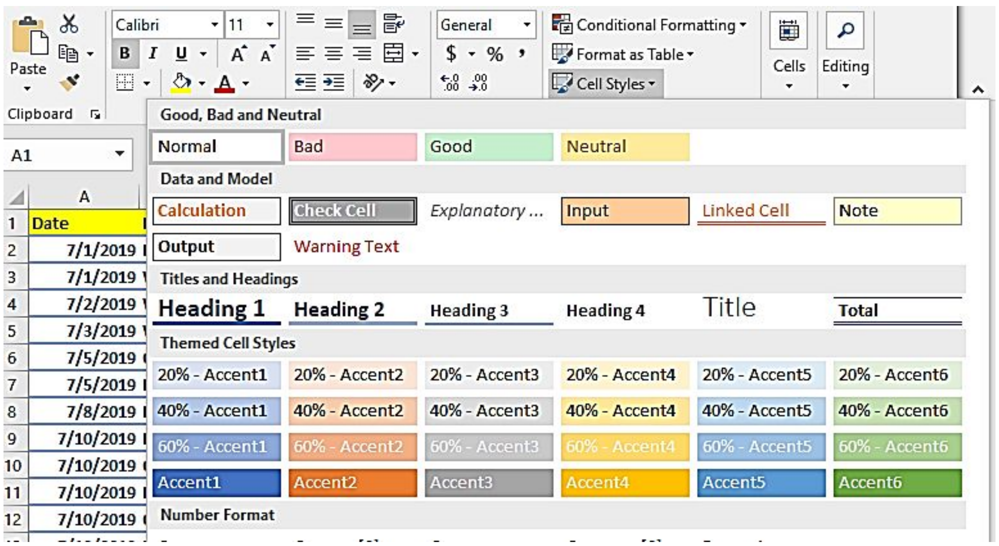
- Once the preview section has shown the required format, select the Ok button to save the rule. If the results aren't what you're looking for, click Format and start modifying.

When changing a conditional formatting formula, always hit the F2 key, then use the arrows to go to the desired location inside the formula. F2 is pushed a second time while adding a cell, and then the cell is clicked.

USING NAMED STYLES FOR EASIER FORMATTING

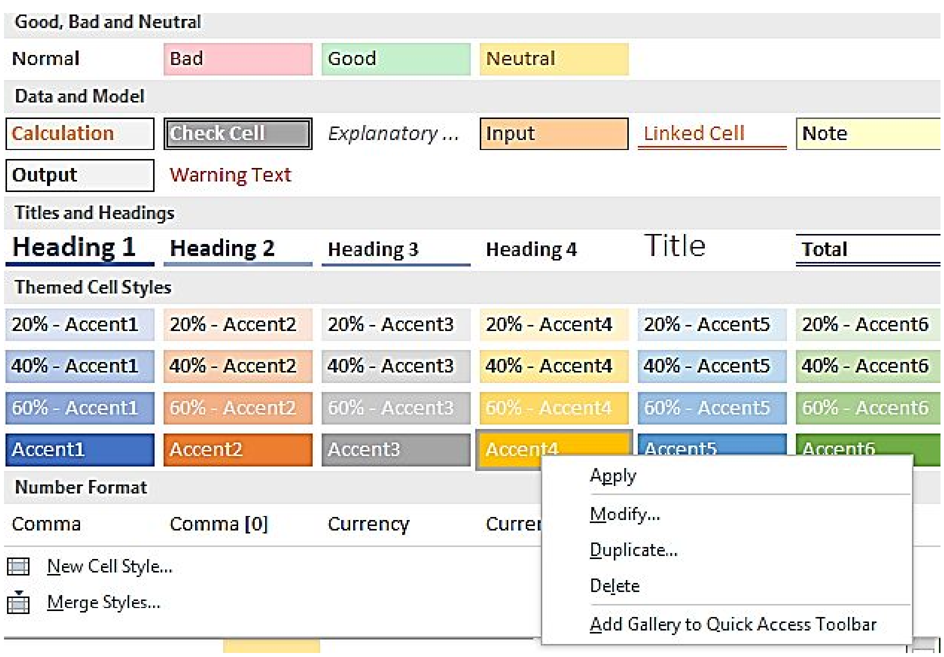
Applying styles

First, choose the cell or range of cells. Below the Conditional Formatting option, click on Cell Styles. On the menu that opens, select a style.



Modifying an existing style

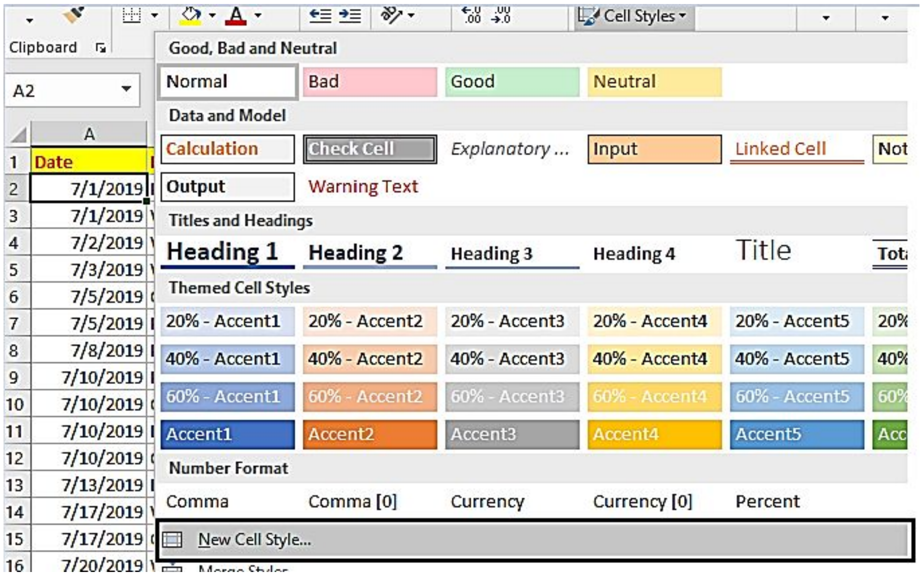
Right-click on it and select **Modify**.



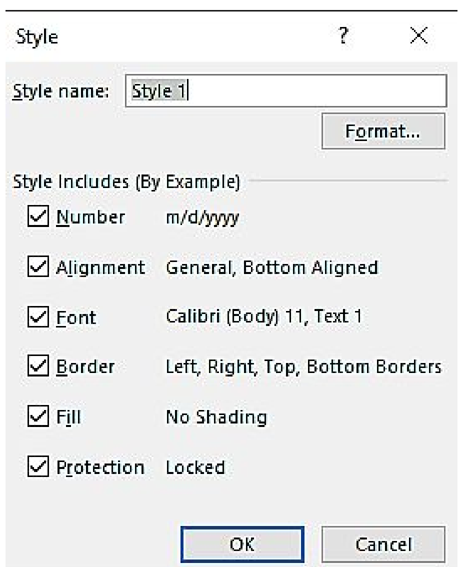
A box appears containing different modifying options. Click **Format** to see the rest of the options.

Creating new styles

Choose the cell, click on **Cell Styles**. Pick **New Cell Style**.



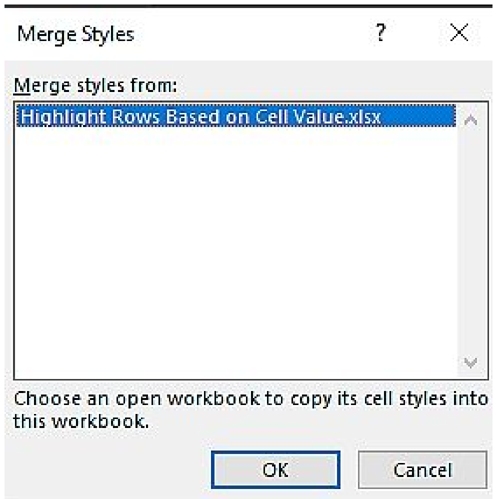
Enter style name. Select Ok. The style will be saved.



Merging styles from other workbooks

Most times, when people create styles, they like to use them in other workbooks. You can easily do that. First, launch the workbooks that have cell styles. Also, launch the other workbook that you will like to merge the style with.

Click on Cell Styles and click on Merge Styles. This opens up the Merge Style dialog box. Choose the workbook and click **Ok**.



Controlling styles with templates

In your Excel Start folder, save the workbook as a template. After that, click File, click New to select a template for the new workbook. Template files may also hold additional named styles, which is a great method to keep your workbooks looking consistent.

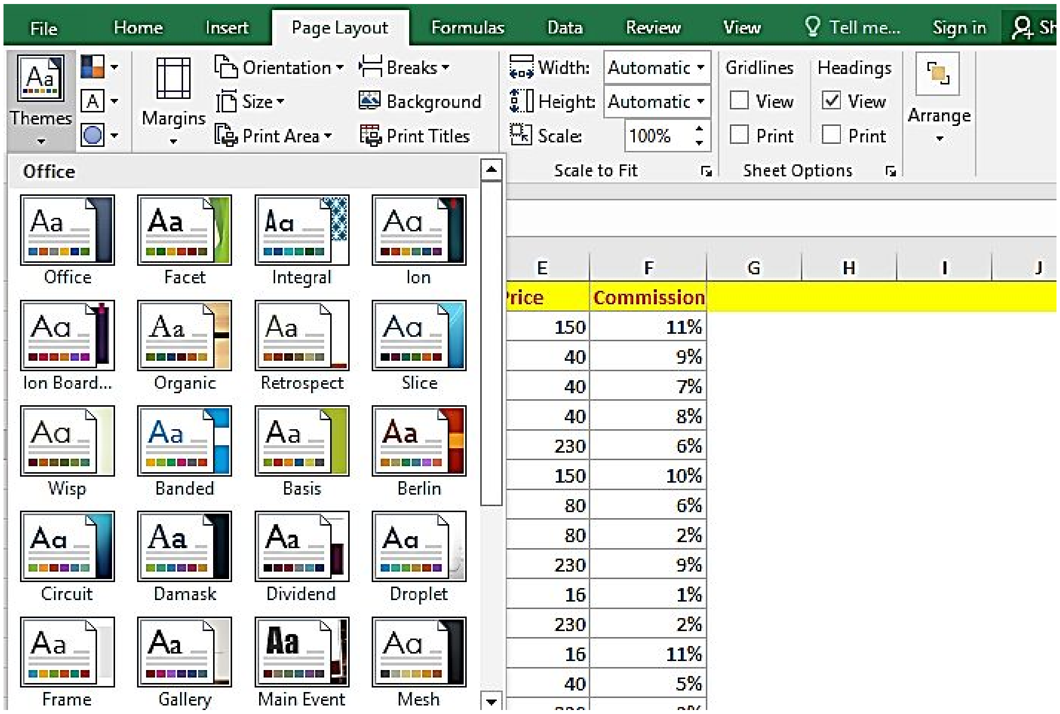
UNDERSTANDING DOCUMENT THEMES

Themes are built-in and customizable functionalities in Excel that allow you to customize the look of your worksheet. In Excel, there are numerous themes, each of which has 12 colors and two fonts (heading and body). The themes make it simple to coordinate colors, fonts, and visual formatting so that they may be utilized and modified quickly.

A standard color theme may be chosen, a custom color theme can be created, theme fonts can be changed, a specific theme can be converted to a new theme, a custom theme can be saved for reuse, and numerous adjustments to the preset themes can be made using Excel themes.

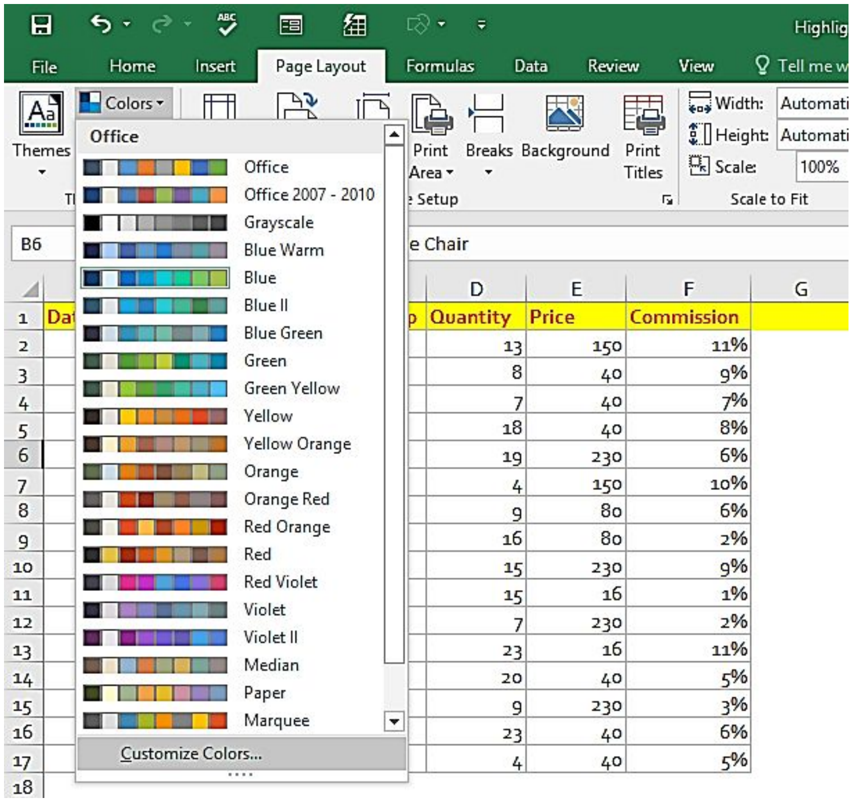
Applying a theme

Click the **Page Layout** tab. You will see the Theme option. Click the down arrow on the Theme option. You will see different themes to apply to your workbook.

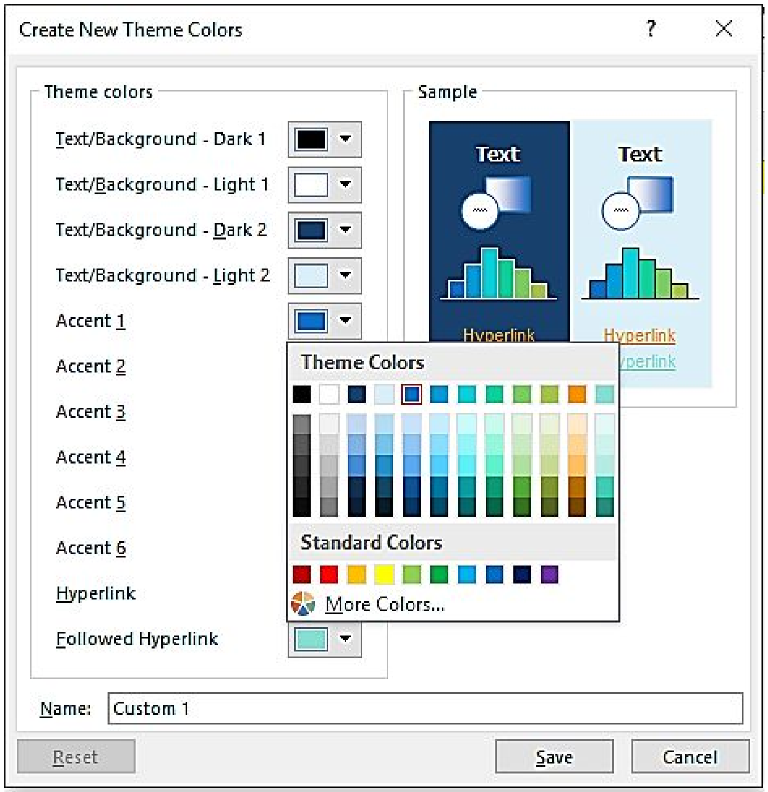


Customizing a theme

To customize a theme, click the down arrow on any of the color, fonts, or effects options and select **Customize**.



From the Create New window, make your theme using the options there. You can add text background, Accents, Hyperlink, etc.



Once, you are done, click **Ok**.

CHAPTER SIX

UNDERSTANDING EXCEL FILES AND TEMPLATES

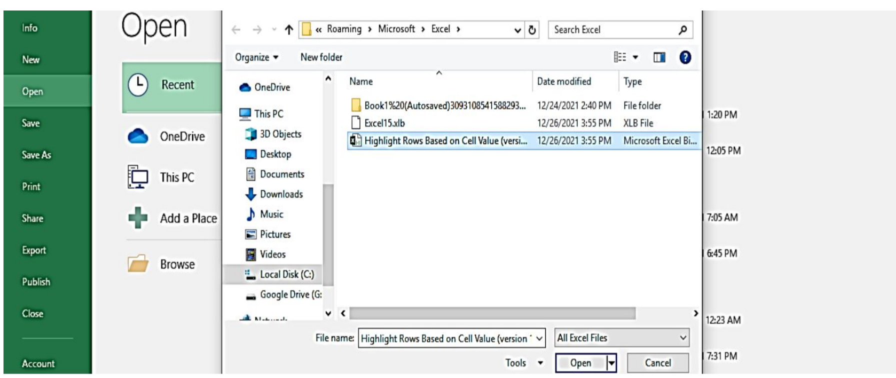
Users may build a new workbook from a blank document in Excel 2022. They also have the option of creating a new worksheet from an existing one. A new workbook comes with three worksheets by default. We may, however, adjust the number of worksheets in a workbook to meet our needs.

Creating a new workbook

To create a new worksheet, simply launch Excel on your computer, click on File and select New. Then, click on Blank workbook.

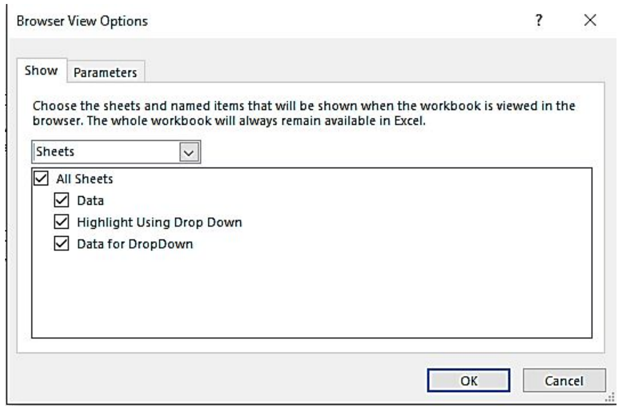
Opening an existing workbook

An existing workbook is a workbook that has been saved already and stored in the computer or cloud. You can open it from your drive or online. To open the file, click on File and select Open. Click **Browse**. A pop-up menu will appear where you will search for the file. Select the file and click **Open**.



Choosing your file display preferences

Click on File, then select Browser View Options. Click on the **Show tab**, then on the down arrow and select **Sheets**.



Pick the worksheets from the list, press **Ok**.

Saving a workbook

Click on File > Save. Select a location where you want to save the workbook. Type in the name for the workbook, then click Save.

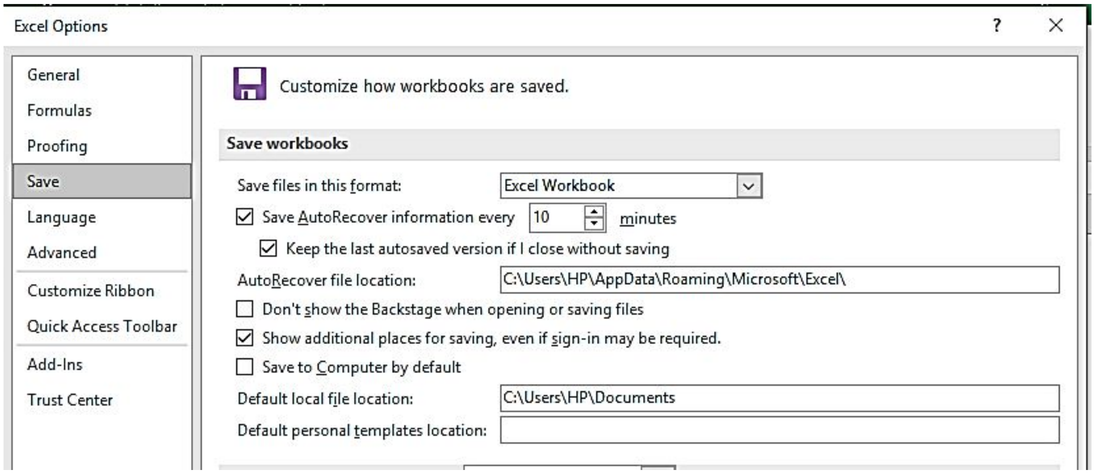
Using AutoRecover

When Excel stops response or it shuts down, AutoRecover automatically recovers the last saved work and will open the file. It will give you two options to choose from which are: to maintain the changes in the documents or dismiss them if we have already saved the data. This helps a lot because it prevents us from losing important data.

It only retrieves files that have been saved. The workbook must have been saved in the system or computer at least once.

Enabling AutoRecover in Excel

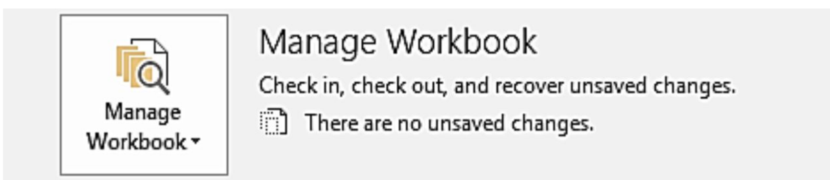
Select File, select Option. On the options menu, click on Save. AutoRecovery options are on the right.



By default, it is already enabled. If yours is not, enable It and click Ok.

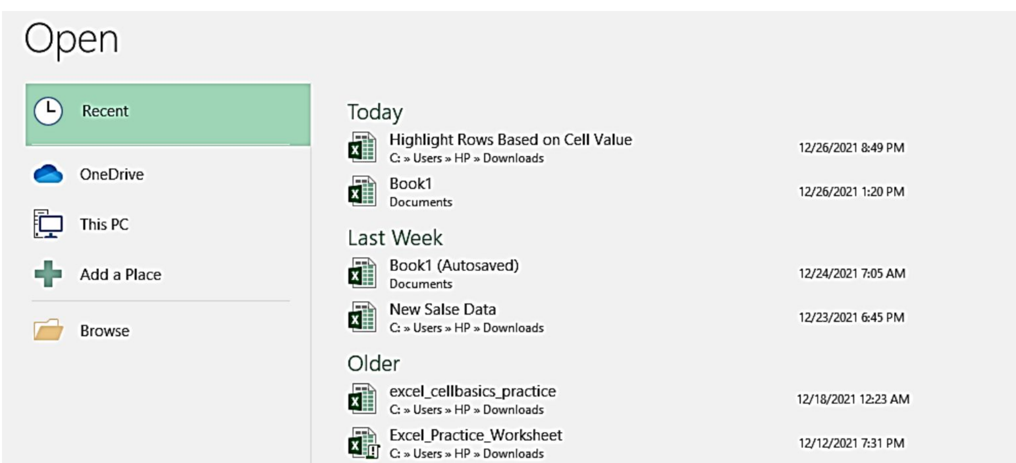
Recovering versions of the current workbook

So first of all, launch the workbook which you want to recover. Select **File** > **Info** > **Manage Versions.** On it, you will find the automatically saved versions with the time beside it.



Recovering unsaved work

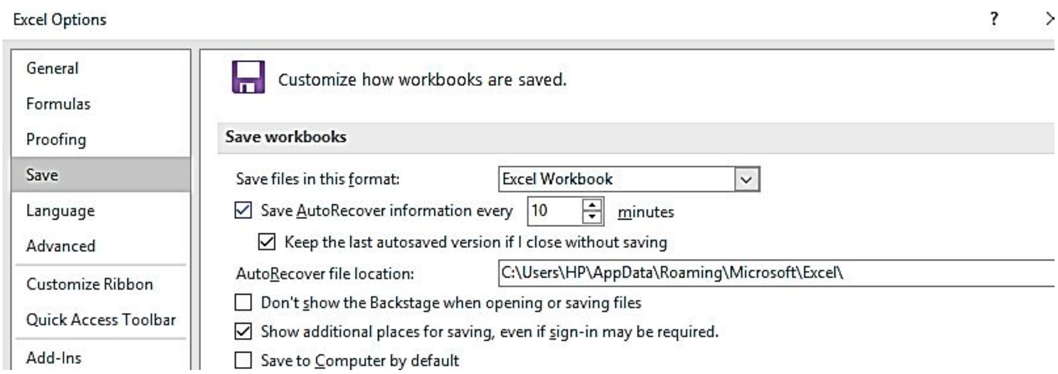
Click **File** > **Open** > Recent Workbooks. Scroll down, then click Recover Unsaved Workbooks.



Click on the workbook for recovering.

Configuring Auto recover

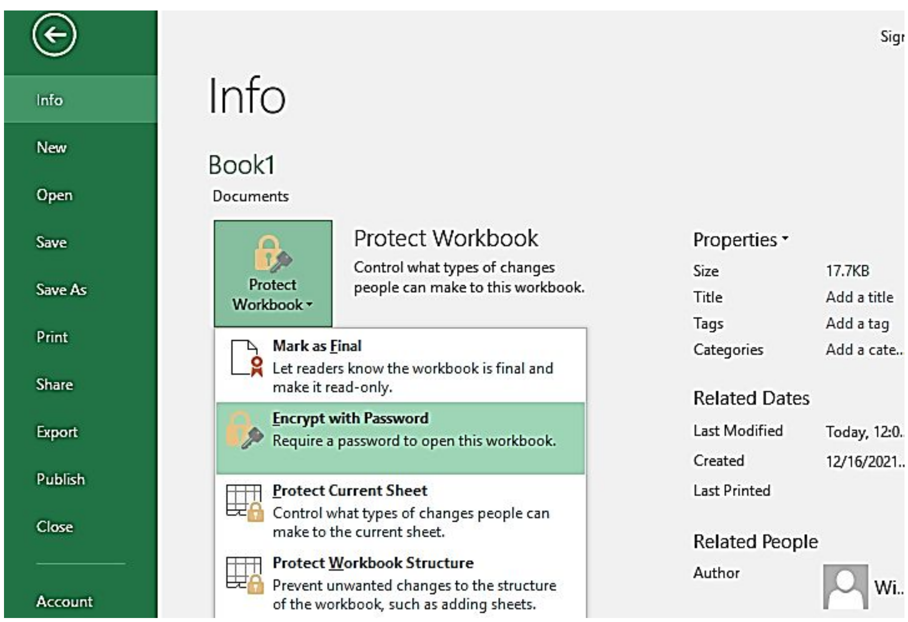
By default, your files are backed up by Excel every ten minutes. You can decide to change these settings. simply click on File > Options > Save > Save Workbooks.



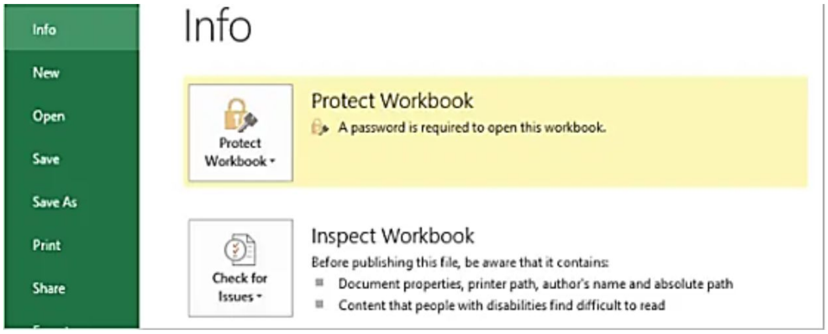
Password-Protecting a Workbook

Excel, however, provides three distinct levels of data protection. This prevents data from being accessed or edited without a password. Follow the steps below to protect your workbook.

Click on File > Info. Click on Protect Workbook. Then select Encrypt with a password.



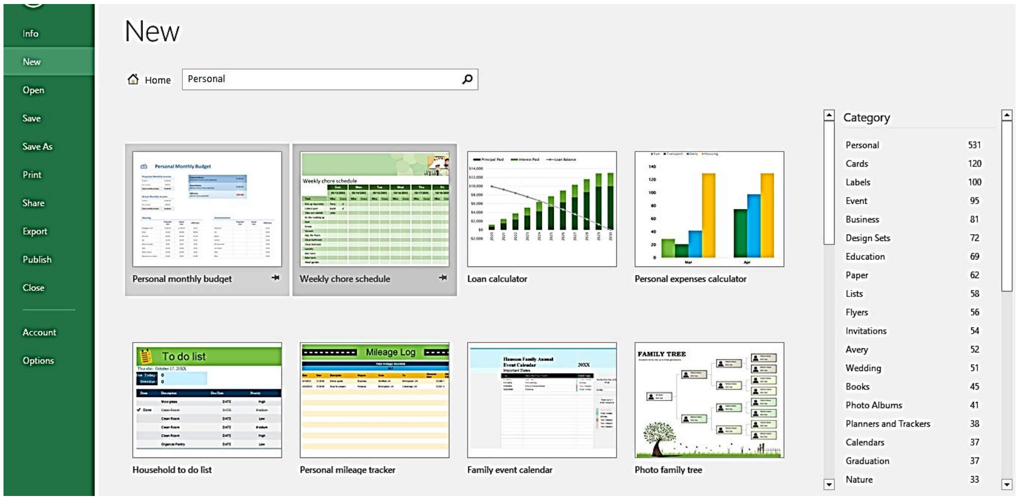
This will open up a password box. Enter in the password and click Ok. You will be asked to confirm the password again. Click Ok. Once you are done, you will see the Protect Workbook option as it has been highlighted stating that a password is needed for the workbook.



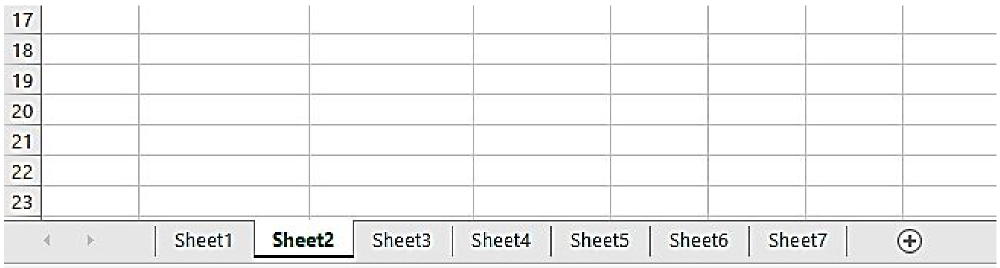
Organizing your files

Microsoft Excel is a spreadsheet-based tool that employs functions and formulae to help you manage figures and data. There are ways to discover a solution to assist you to organize your worksheets.

1. **Templates**: You shouldn't spend time re-creating Worksheets from start every time you need to evaluate data. Instead, Microsoft Excel comes with a large number of user-created templates. Simply select one of the numerous templates available in Excel by going to File > New. Of course, selecting a template that exactly matches your data analysis method may be tough.



2. **Multiple Sheets**: When dealing with anything complicated or with much data, use multiple sheets for your works. Divide your data into different worksheets and name each one appropriately. This will make it simple to locate the information you want.



3. **Highlighting the essential data**: You always should emphasize the most critical information while using any management application. When working with Excel, this is particularly true if you have a full team working on a single spreadsheet. One of the simplest ways to achieve this is to construct a dashboard sheet that summarizes your major data elements. Furthermore, you should always maintain your vital information in a legible font and use conditional formatting to provide heights and colors to important cells.

4. **Sorting Data**: Knowing how to categorize/sort your data is an important element of data analysis. It makes no difference whether you wish to order the names alphabetically or list the goods from cheapest to most expensive. Sorting your data can aid you in better understanding and visualization of your data. You may arrange your data alphabetically, numerically, by built column list, formatting, an icon set, or by time and date in Excel.

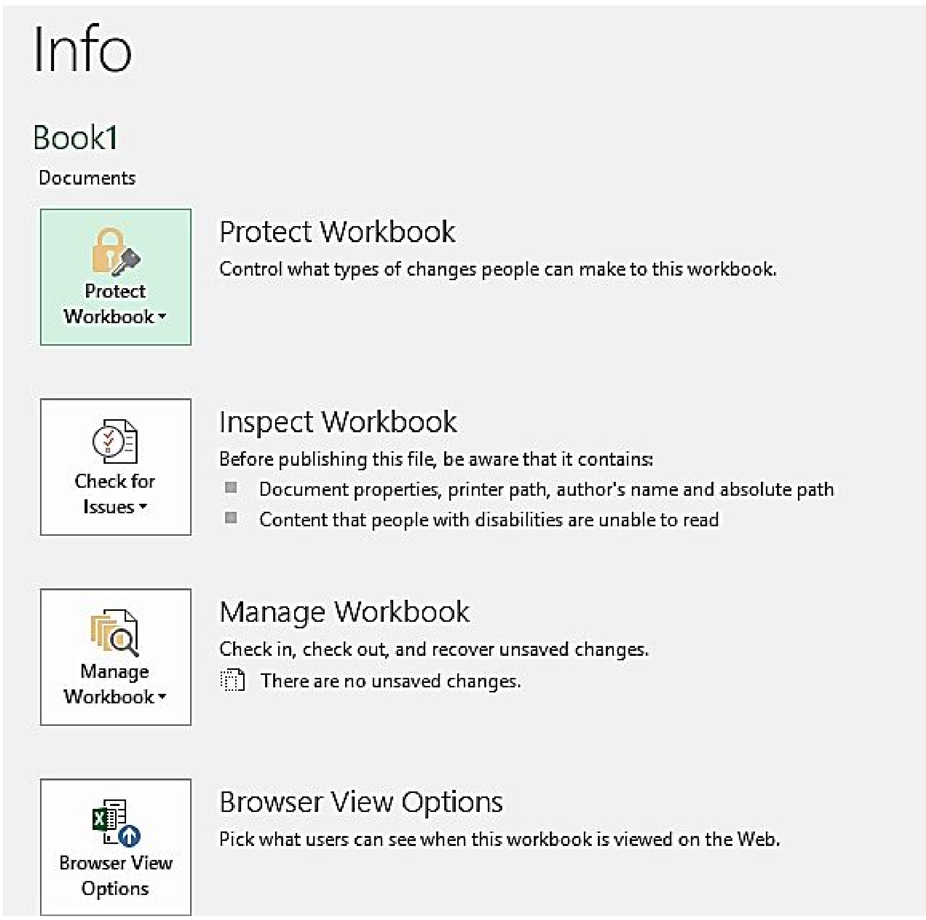
5. **Hyperlink cells**: A times, you will often spend time digging through all of the worksheets for a specific bit of data. However, this does not have to be the case. Rather, you may give your relevant cells names and create hyperlinks between them in your sheets to help you navigate the data.

OTHER WORKBOOK INFO OPTIONS

When you click on File and select Info, you will see different options on the Info menu. those options are explained below.

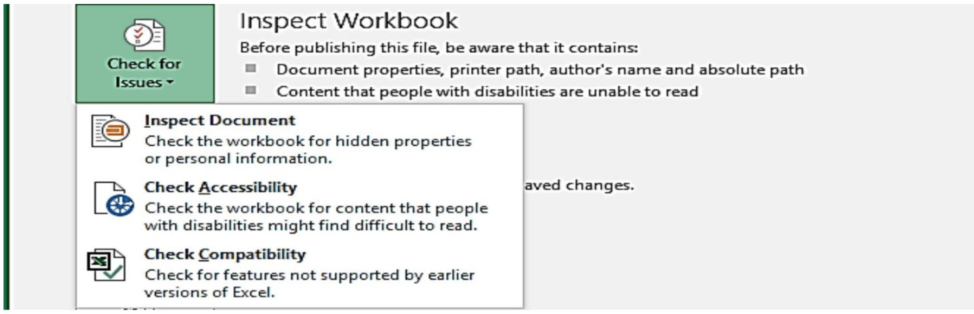
Protect Worksheet options

This option allows you to control the type of changes that people can make to a workbook.



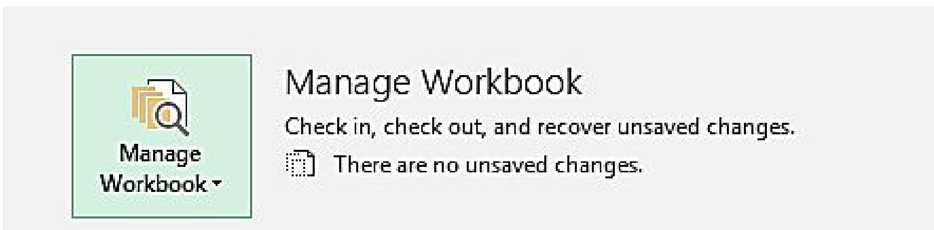
Check for issues options

This is to inspect your workbook, check accessibility, and check compatibility.



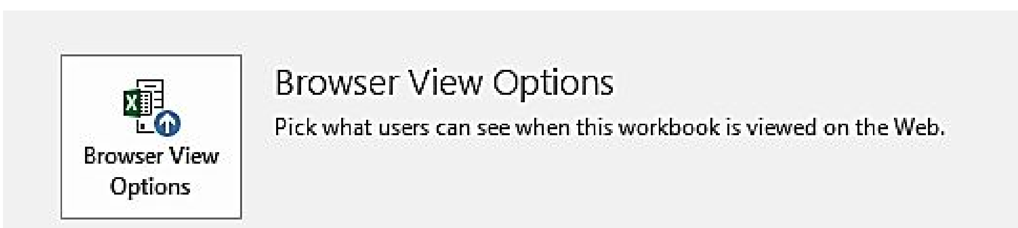
Manage workbook option

This is to check in, check out, and recover unsaved changes on your workbook.



Browser view options

This determines what users can see on your workbook when viewed on the internet.

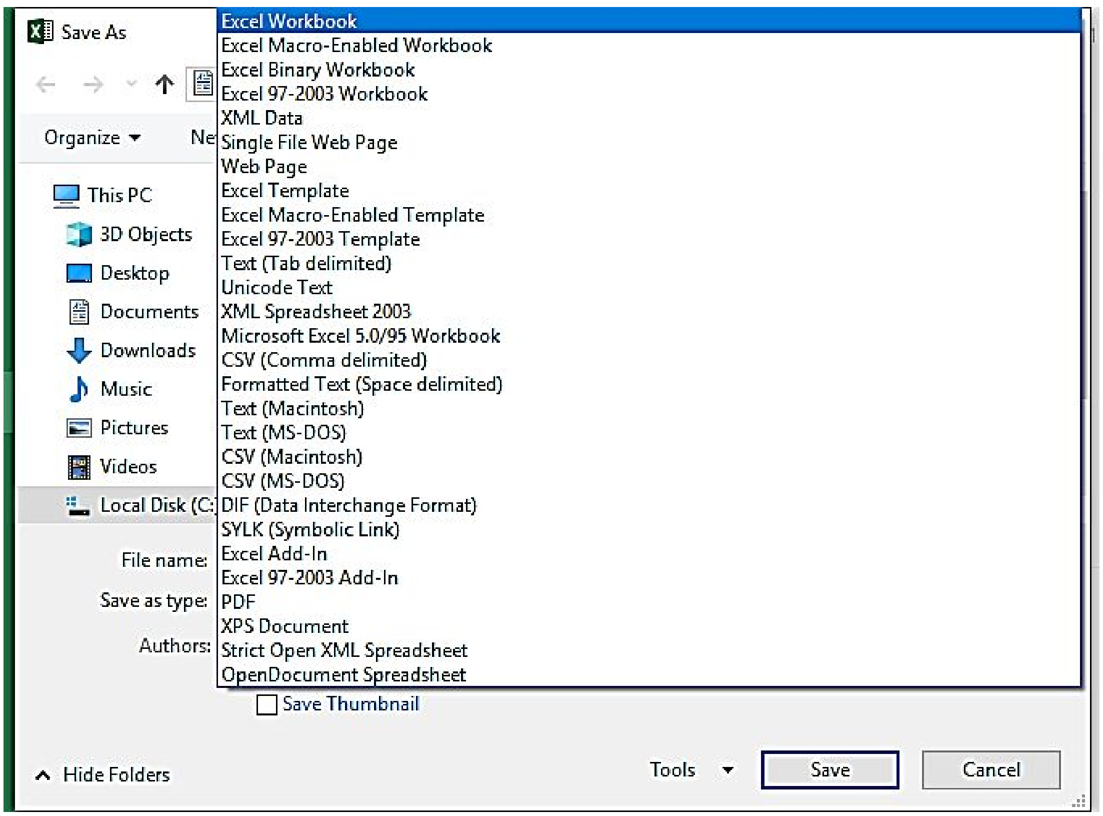


Compatibility mode section

This helps you to create documents that can be viewed by everyone. Since Excel has been there for years, it has a variety of versions. As a result, documents created in later versions might not be compatible with older versions. It is dependent on the content of a document, which is a difficult factor to consider. For instance, a feature developed in Excel 2021 will almost certainly not work with Excel 2013. The majority of Excel users, however, are unaware of this.

Microsoft implemented Compatibility Mode to Excel to address the problem. Your workbook in compatibility mode will be readable in former versions of Excel. Compatibility Mode guarantees that workbooks created in recent editions may be viewed even if you're using an earlier version. Some documents may show improperly or not open at all if you don't use Compatibility Mode. When software upgrades affect the core of a program over time, this is typical.

To save in compatibility mode, simply open the workbook, click File > Save As >. Then, click on the down arrow on the **Save As Type** box. Select the version you want.



Closing Workbooks

When a worksheet is open, and you want to close it but not the Excel program, simply click on **File** > **Close**. Use **Control key + W** also**.** To close every workbook that is open when you have more than one workbook open, simply press down the Shift key as you select Close from the File menu.

Safeguarding your work

Nothing is more frustrating than working for hours on a complex Excel spreadsheet only to have it destroyed due to a power outage, a hard drive crash, or even a human mistake. Protecting oneself against these tragedies, however, is not difficult.

We examined the AutoRecover option earlier in this chapter, which causes Excel to store a backup copy of your workbook at regular intervals. It's a fantastic concept, but it's far from the sole safeguard you should use. If a file is critical, more precautions must be taken to protect its security. Your work may be safeguarded using the following backup options:

- Save copies of the documents on the same disk as a backup. As you are saving your work, pick the **Always Create a Backup** option, this is essentially what occurs. Although this option provides some security if you make a mess of the spreadsheet, it is useless if your whole hard drive collapses.
- Keep a duplicate on a separate disk for backup. This assumes that your computer has more than one hard disk. Because the chances of both hard drives failing are slim, this technique provides greater protection than the previous strategy.
- Keeping a backup copy on the internet (cloud) is a good idea. Assumes that your computer is linked to a server where you may upload and download files. This procedure is relatively risk-free. However, if the network server is in the same building as you, you are in danger if the whole building burns down or is destroyed in some other way.

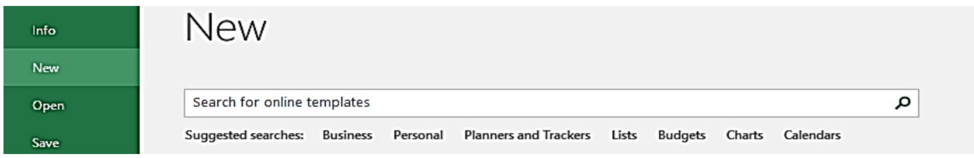
Working with templates

Microsoft Excel templates are a valuable feature of the Excel experience and a time-saving tool. Once you've produced a template, all it takes is a few simple modifications to make it fit your current needs, and it can then be utilized in a variety of circumstances and reused over and over again. Excel templates may also assist you in producing consistent and appealing papers that will wow your coworkers or superiors while also making you appear your best.

Excel schedules, budget plans, receipts, inventory, and dashboards are all examples of commonly used document types that benefit from templates. What could be cooler than selecting a fully prepared worksheet with the design and feel you desire and that you can quickly customize to fit your needs?

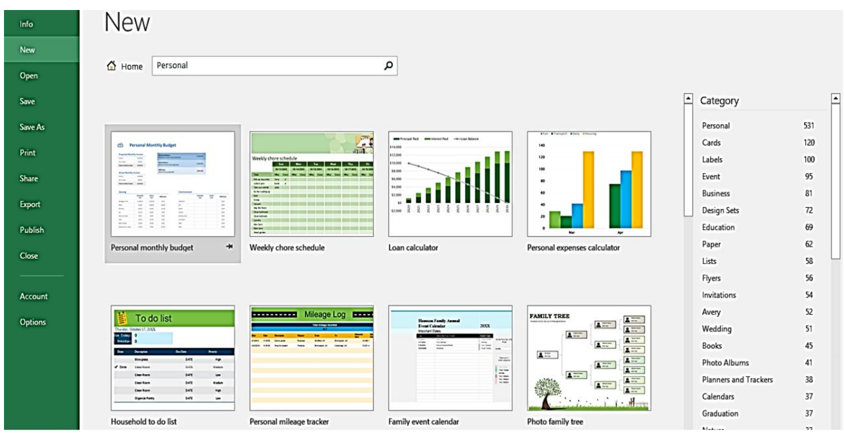
Exploring Excel templates

To explore the Excel templates, click on File > New. You will see a search box. On it, you can search for templates on the web.



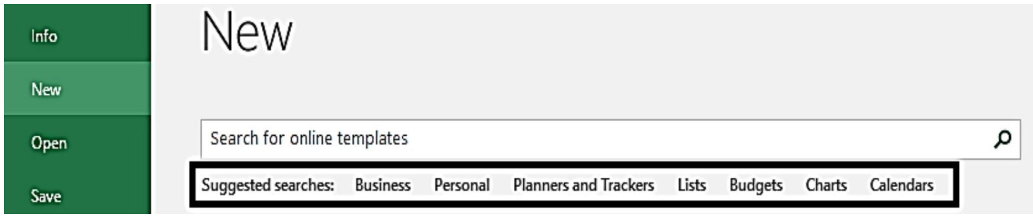
Viewing templates

Choose **File** > **New** to bring up the available templates screen in Backstage View, to see the Excel templates. You can templates maybe from your drive or Microsoft Office Online. In the right panel, when you pick a template thumbnail, you will get a preview.

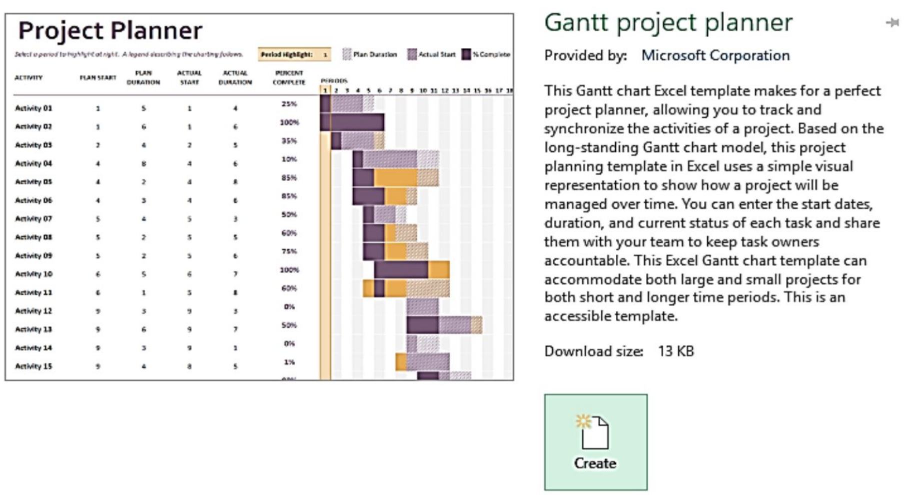


Creating a workbook from a template

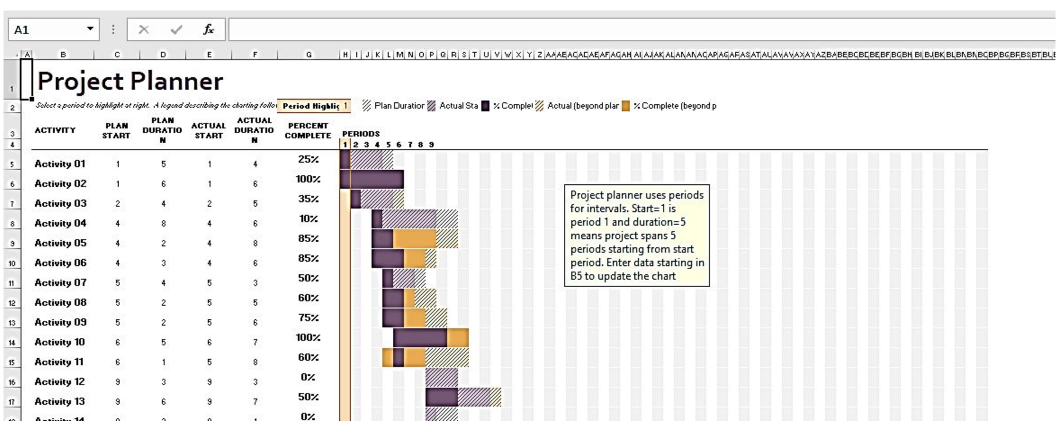
Click on **File** > **New**. On the search box, type in the template you want to use or you click on any of the options below the search box which are the suggested searches. You must be connected to the internet.



This will open a box, where you will see the information about the template. Click Create.



The template will begin to download. Once it's done, it will open up the template in your worksheet.

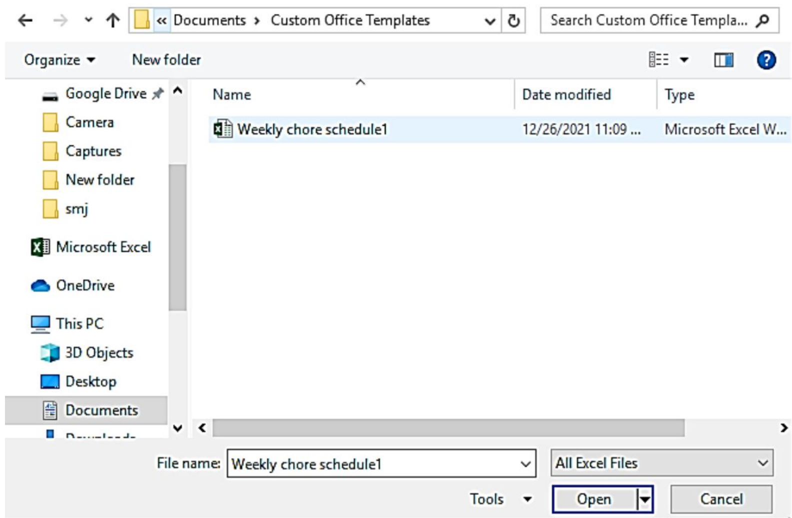


Modifying a template

Open the Excel Template. Click File > Open > Browse. In the dialog box, open the location where the template is saved. When saved in the default save location, put this path in the Address box

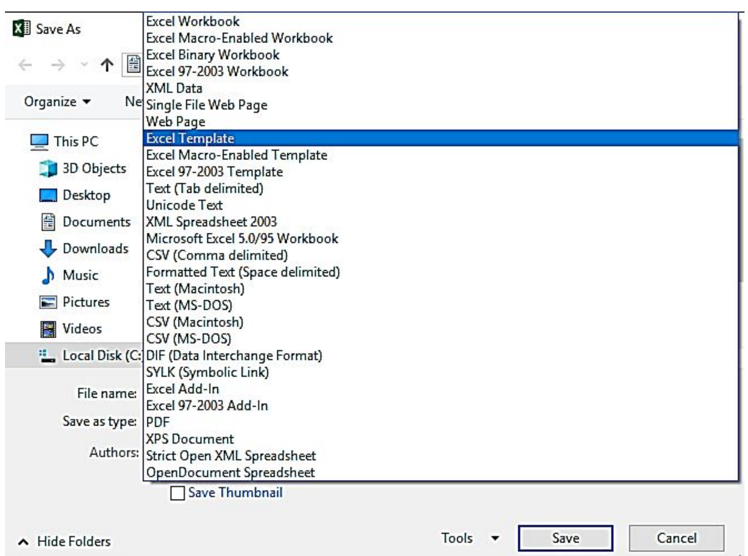
C:\Users\%Username%\Documents\Custom Office Template. Press **Enter**.

Click the file and select **Open**.



Creating a worksheet template

Create a blank workbook. Apply some data into it (if you want) then click on File > Save > Browse. Select a location where you want to save the file. On the Save as type box, click on the drop-down arrow and select Excel Template.



Click on Save to save the worksheet. By default, this file will be saved in the Template folder.

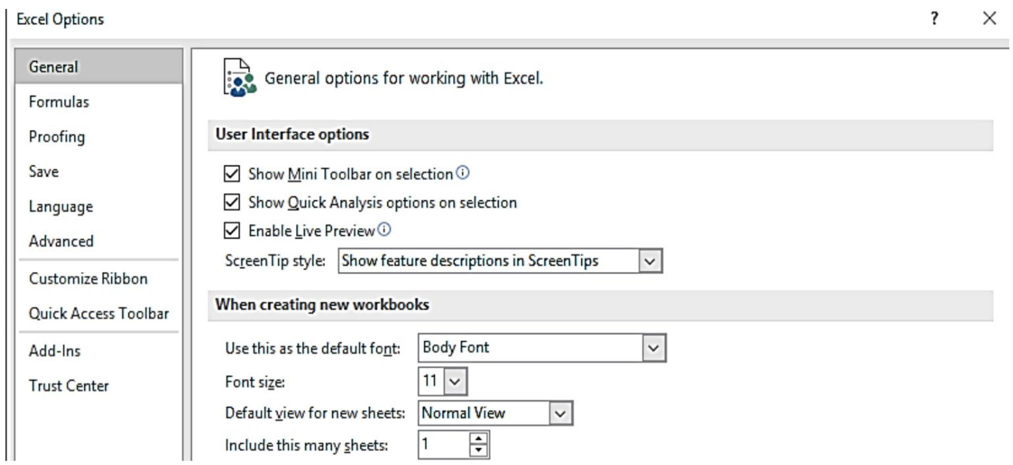
Editing your template

Click on File > Open > Browse. Click on Documents and select Custom Office Templates folder.

Select your Template, then click Open. apply the edits you want to your templates.

Resetting the default workbook

Click on File > Options. On the General tab, below When creating a new workbook option, choose the options best suitable for you. When you are done, click Ok.



Using custom workbook templates

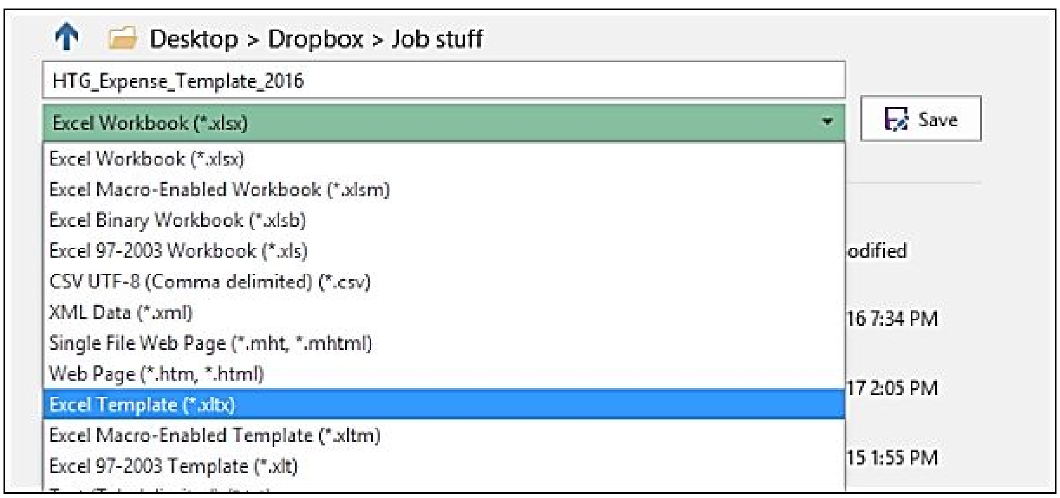
It's simple to create your own Excel templates. You begin by creating a workbook using the normal method, and the most difficult aspect is getting it to appear exactly how you want it to. Because whatever formatting, styles, text, and pictures you use in the workbook will appear in all subsequent workbooks based on this template, it's worth spending some time and effort in both the design and contents. You may save the following settings in an Excel template:

- The number of sheets and the kind of sheets
- Formats and styles for cells
- Each sheet's page layout and print regions
- To make particular sheets, rows, columns, or cells invisible, use hidden regions.

- Protected zones to keep some cells from changing.
- Text that should appear in all workbooks generated using the same template, such as column labels or page headers
- Formulas, hyperlinks, charts, photos, and other graphics are all examples of graphics.
- Drop-down lists, validation messages or warnings, and other data validation features are available in Excel.
- Options for calculations and window views, such as freezing the header row
- Custom forms using macros and ActiveX controls

Creating custom templates

After creating the workbook, click on File > Save as > select a location. In the dialog box, enter the name of the template. On the Save as type box, choose Excel Template **(*.xltx).** Select Excel Macro-Enabled Template **(*.xltm)** if the workbook consists of Macro. As you select these templates, the file extension in the **file name** field will change to the corresponding extension.



Saving your custom templates

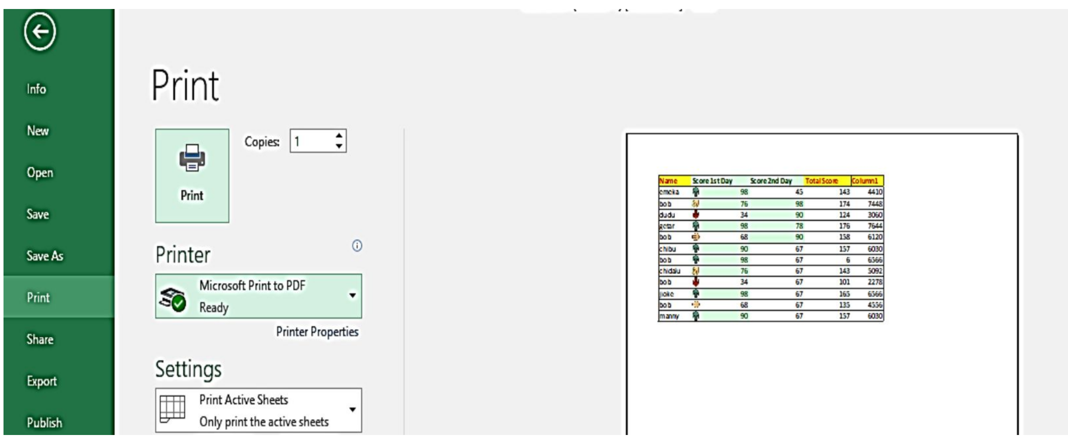
When saving your work as an Excel Template, the location will be changed by Excel. It will be saved to the default templates folder **(C:\Users\<User Name>\AppData\Roaming\Microsoft\Templates).** So, if you want another location for the file, try to change the location after choosing Excel Template **(*.xltx)** as a document type. Even though you choose another location, the copy of the file will be stored in the default template folder. So, click on **Save** to save your custom templates.

CHAPTER SEVEN

PRINTING YOUR WORK

Doing Basic Printing

Print in Excel is for printing the data in the worksheet, but only to the width that the printer option allows for chosen and available pages. The present worksheet, active sheet, whole workbook, any chosen table, or any specified range of worksheets may all be printed. To print your work, simply open the worksheet, click on **File** > **Print**. On the **Print setting** menu, click the arrow and pick **Print Entire Workbook**. Then, select how many copies you want. Click **Print**.

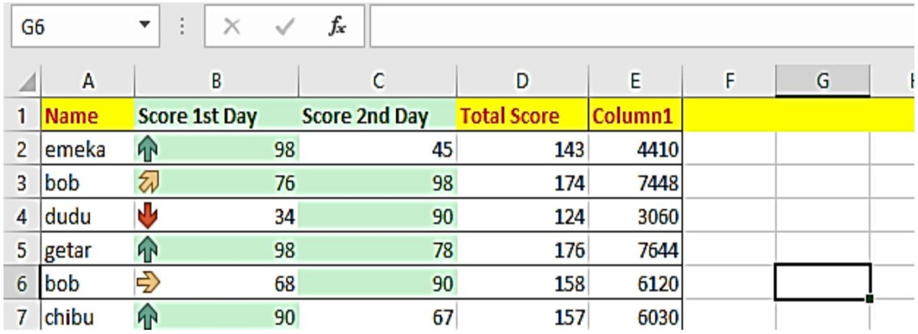


Changing your Page View

This is an excellent way of knowing how your worksheet appears when printed. On the page view, the functionalities of the normal view will be there but this time you will have a few more tools like header, footer, layouts, and more. This will help you complete your page perfectly.

Normal view

The standard view of your worksheet. How your worksheet looks when you've not made any view edit on it.

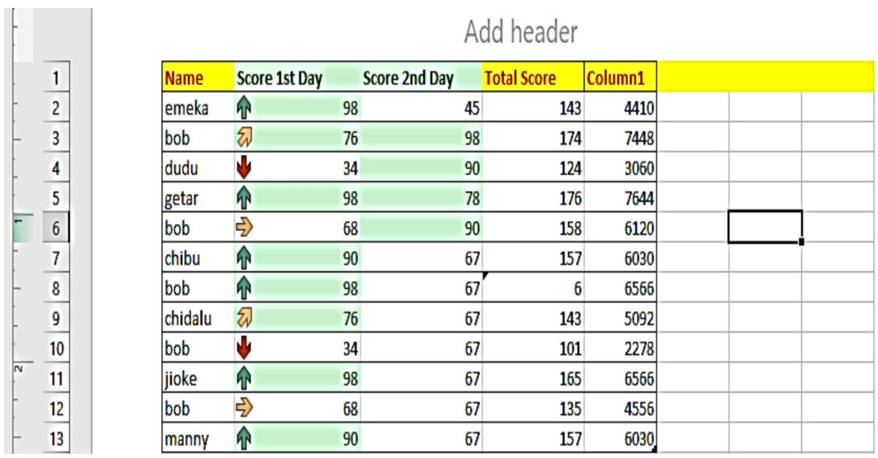


G6

Name	Score 1st Day	Score 2nd Day	Total Score	Column1
emeka	98	45	143	4410
bob	76	98	174	7448
dudu	34	90	124	3060
getar	98	78	176	7644
bob	68	90	158	6120
chibu	90	67	157	6030

Page layout view

Select the worksheet that you want to change the view. Click the View tab on the ribbon, then select **Page Layout View**. Your workbook will be displayed in the page layout view as you can see in the image below.

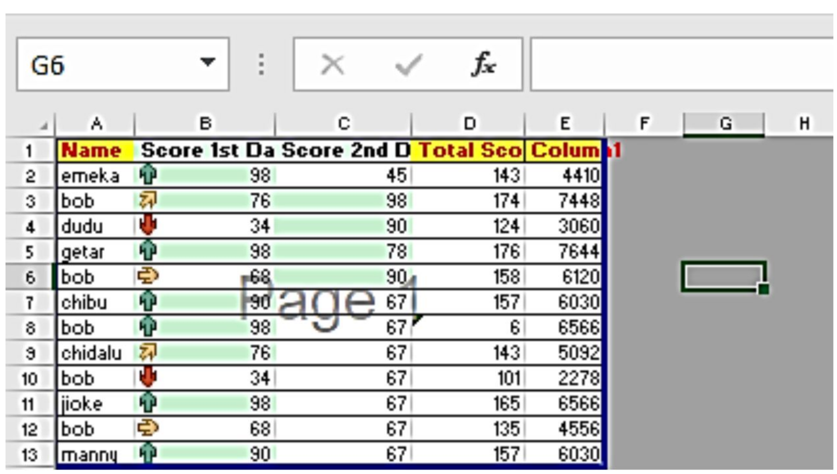


Add header

Name	Score 1st Day	Score 2nd Day	Total Score	Column1
emeka	98	45	143	4410
bob	76	98	174	7448
dudu	34	90	124	3060
getar	98	78	176	7644
bob	68	90	158	6120
chibu	90	67	157	6030
bob	98	67	6	6566
chidalu	76	67	143	5092
bob	34	67	101	2278
jioke	98	67	165	6566
bob	68	67	135	4556
manny	90	67	157	6030

Page break preview

Select the worksheet. Click View, then **Page Break View**.



G6

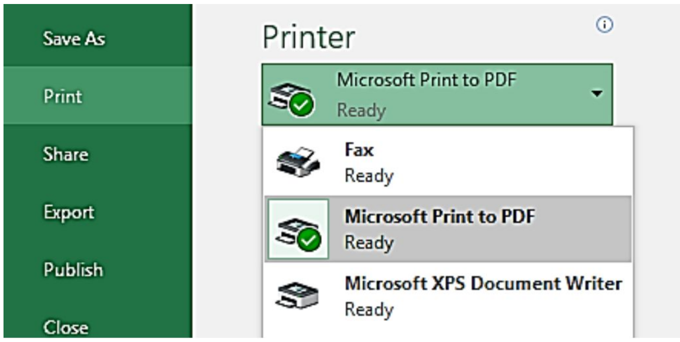
Page 1

Name	Score 1st Da	Score 2nd D	Total Sco	Colum1
emeka	98	45	143	4410
bob	76	98	174	7448
dudu	34	90	124	3060
getar	98	78	176	7644
bob	68	90	158	6120
chibu	90	67	157	6030
bob	98	67	6	6566
chidalu	76	67	143	5092
bob	34	67	101	2278
jioke	98	67	165	6566
bob	68	67	135	4556
manny	90	67	157	6030

ADJUSTING COMMON PAGE SETUP SETTINGS

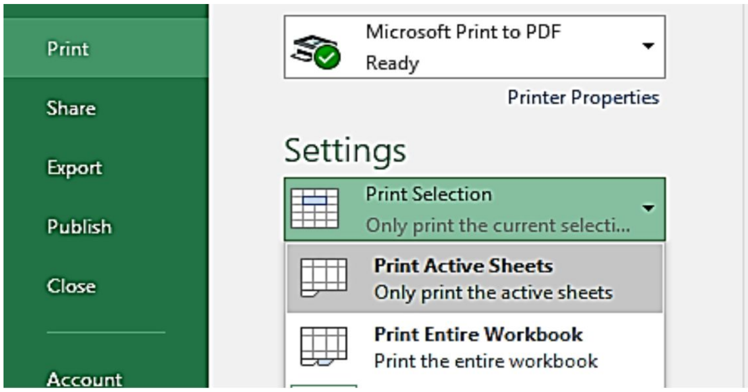
Choosing your printer

To print, your work, you need a printer. So, on the print page, click on the drop-down arrow below the Printer section. You will see a list of printers, select one from there. If you want to add a printer, click Add Printer.



Specifying what you want to print

When printing a workbook, you can decide what you want to print from that particular workbook. When you go to the print setting menu and click on the drop-down arrow, you will see a list of options in which you can select how you want to print your workbook.



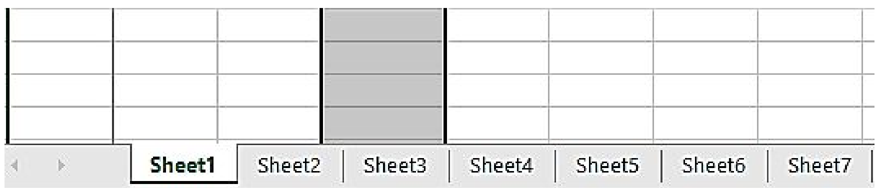
Below are the options you will see and what it means;

1. **Print Entire Workbook**: To print the whole workbook. If you have many sheets, use this option to print them all.
2. **Print Selection**: For printing just the current selection in your workbook. So, to print some portion of your worksheet, simply

highlight the areas, then select this option.

SALES REPORTS 2022			
MONTH	SALES	DATES	TIME
JAN	100	12/10/2021	12:17 PM
FEB	200	12/11/2021	1:17 PM
MAR	300	12/12/2021	2:17 PM
APR	400	12/13/2021	3:17 PM
MAY	500	12/14/2021	4:17 PM

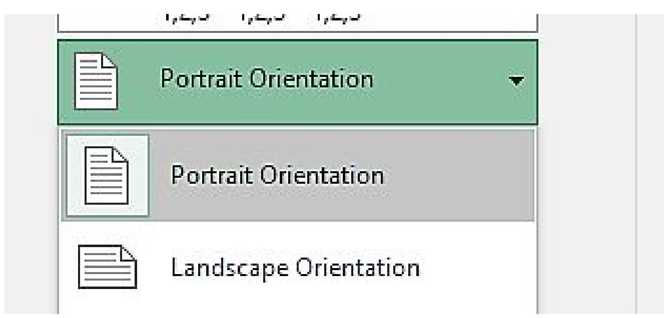
3. **Print Active Sheets**: To print just the active sheet i.e. the sheet that's being displayed on the screen. In the image below, the active sheet is Sheet 1. So that is what you will print.



4. **Print Selected Table**: This option is to print the selected table on your worksheet.

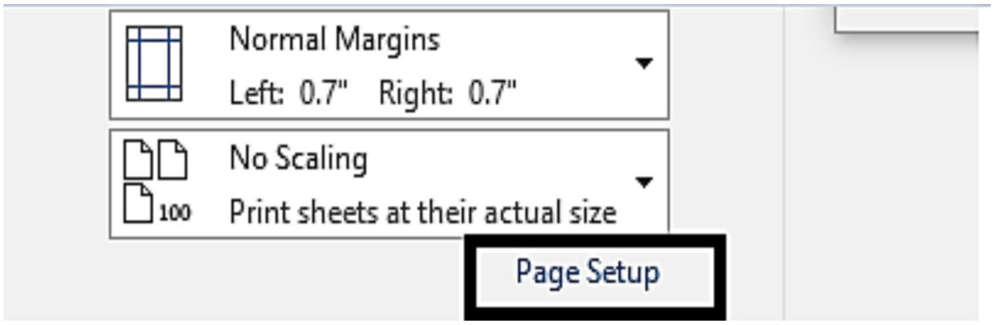
Changing page orientation

There are two types of page orientation in Excel which are Landscape orientation and Portrait orientation. The Portrait orientation is mostly used when you have more rows and lesser columns on your worksheet while Landscape orientation is used when you have more columns and lesser rows on the worksheet. You will find this page orientation on the Print setting menu.

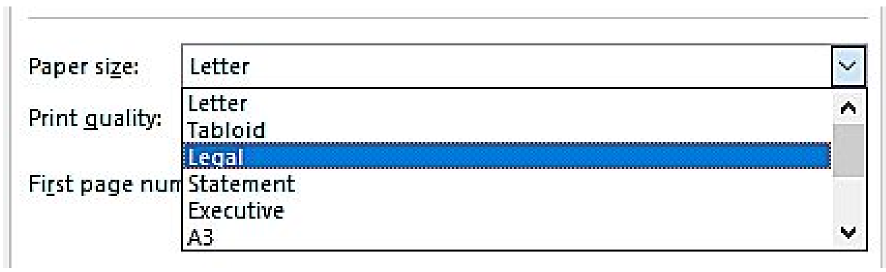


Specifying paper size

Click on Page Setup below the Print Setting option.

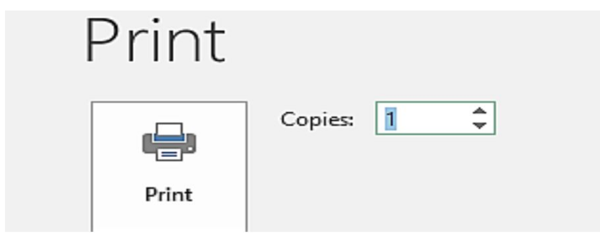


In the dialog box that opens, click on the drop-down arrow on the Paper Size option. Pick the paper size for your workbook.



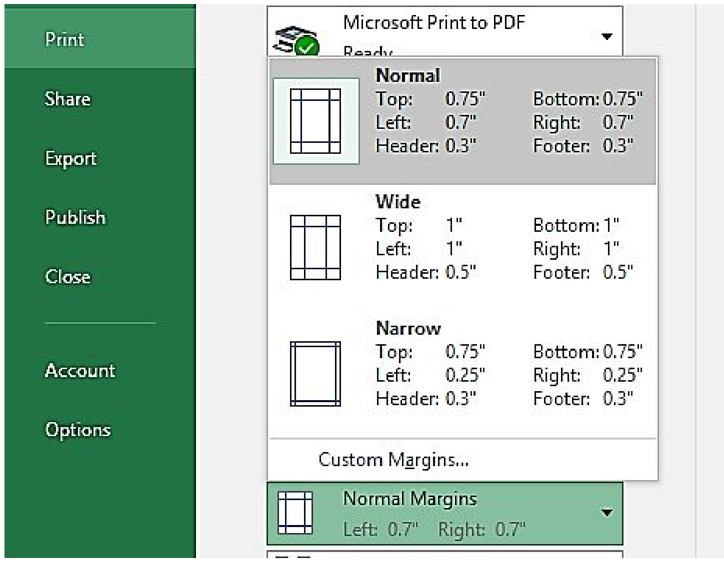
Printing multiple copies of your reports

If you want to print more copies, click on the arrow next to the Copies option. Type in the number of copies you want and then click Print.



Adjusting the page margins

to change the page margins of your worksheet, click on the arrow on the Normal Margin option. You will see different options for margins. Select the one you want to use.

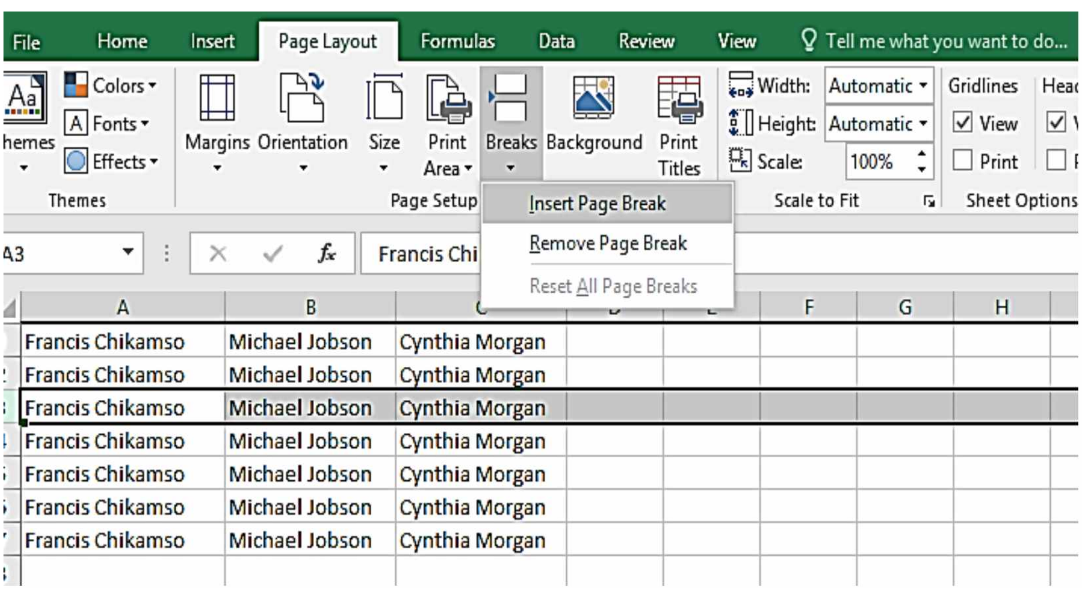


Understanding page breaks

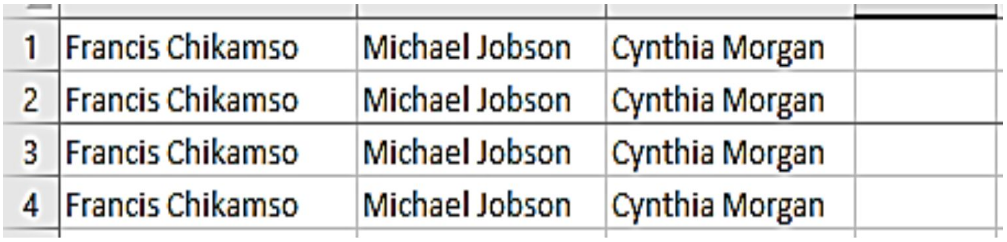
As the name sounds, Page Breaks is used to break pages into different forms. In Excel, it is used to reduce the length of a page to minimize data misalignment when printing the work.

Inserting a page break

First, choose the row or column for the page break. Click Page Layout. On-Page Setup, click Breaks and select Insert Page breaks.



This action will display a thick line on the worksheet to let you know where the new page starts from.

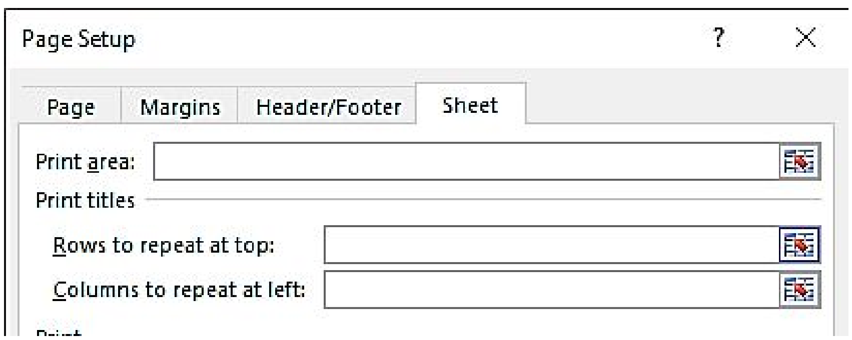


Removing manual page breaks

To remove the page breaks, click on a cell that is below the cell you inserted a page break, click on Breaks, then select **Remove Breaks**.

Printing row and column titles

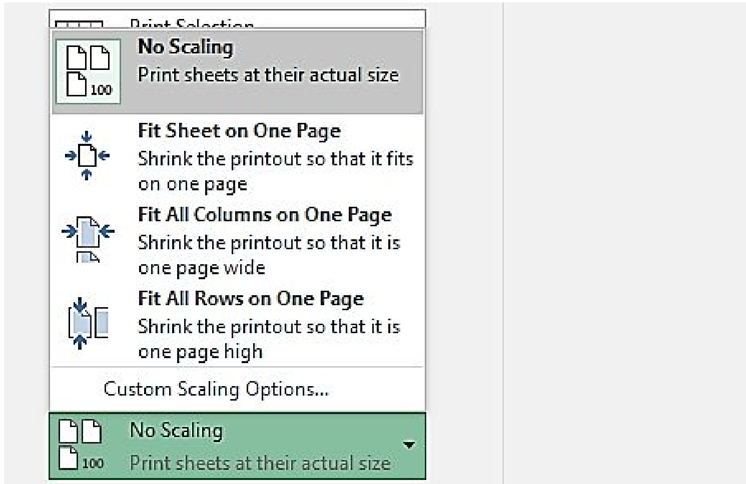
Click the Page Layout tab, select **Print Titles**.



On the Rows to repeat at the top and Columns to repeat at the left box, choose the row or column you wish to print. After that, click Ok.

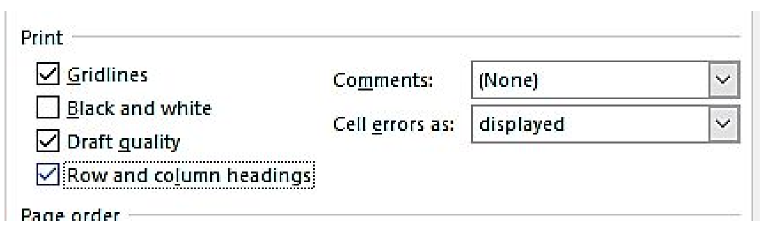
Scaling printed output

Scaling is used to determine how you want to print the sheets. Click on the Scaling arrow to see the list of options just as you can see in the image below. You can decide to print the actual size of the sheets, fit the sheets on one page, fit all columns on one page, or fit all rows on one page.



Printing cell gridlines

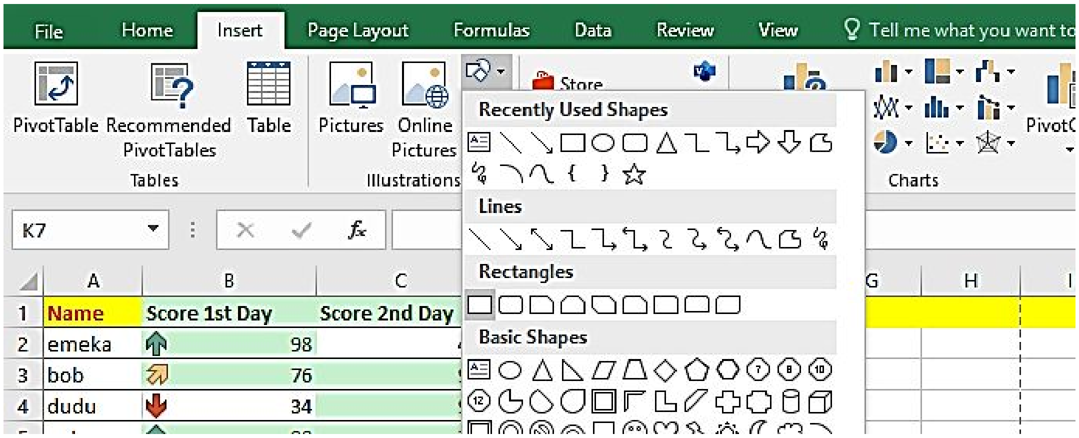
By default, the letters and numbers that function as row and column headings do not print. Neither do the gridlines on the worksheet. If you need to print them also while printing, then you can turn them on. So, on the ribbon, click Page Layout, then select Print Titles. On the Page Setup box, check the box next to Gridlines. If you also want to print the row and column headings, check the box close to the option. Once you are done, click Ok.



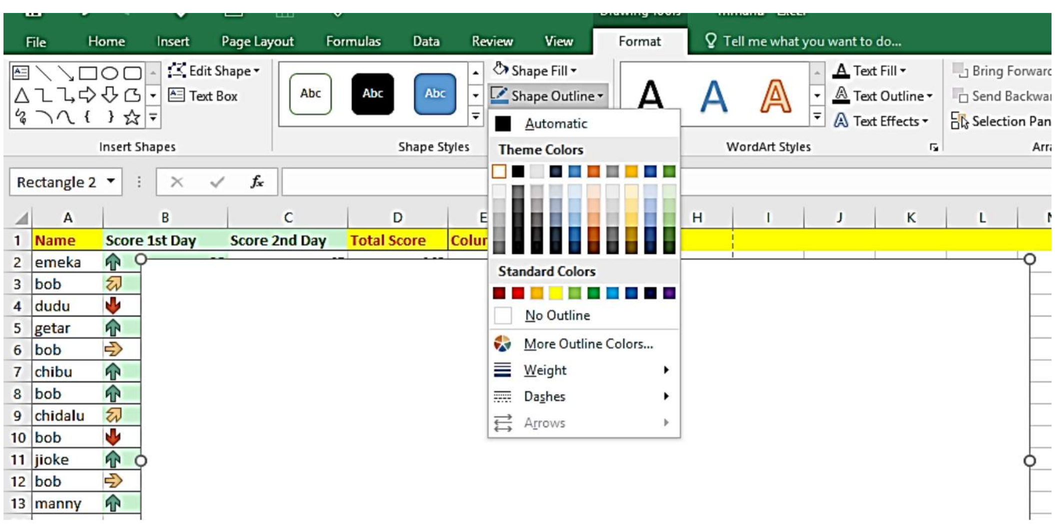
Using a background image

By default, when printing a worksheet, it only prints the cells which contain the data. If there is any other content on the worksheet, it won’t be printed. However, you can add a background to your excel printouts. You can add a background by clicking on Page Layout, then, select Background. The issue with this step is that excel will not be able to print any backgrounds that have been added this way. So you can make use of shapes, images to work this out. So, let’s insert a shape and use it as our background image.

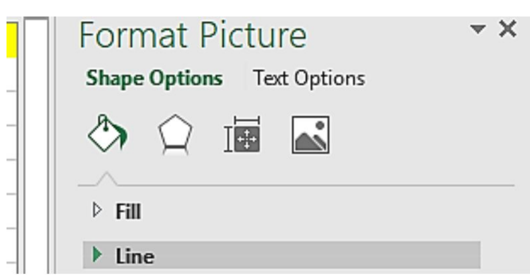
Click **Insert** and on the illustrations group, select the **Shape icon** and click on the arrow. Select any shape. Here, I choose a shape from the rectangles shape group.



Then, draw how you want the shape to be on the worksheet. The Drawing Tool tab will now be active. Click Shape fill. Select White. Then, click Shape Outline. Then, select White as the outline color.



Now, on the shape, right-click. Chose Format Shape. This opens up the Format Picture pane



On the pane, click on Fill. Then, choose the Picture or texture fill option. Click on File. This opens a menu where you will select the picture you want to use. Click on the picture and click **Insert**. Check the box next to the Tile picture as a texture option. On the transparency slide, set it to 75%.

Now, click on the size and properties icon (the third icon on the Shape Options). Click on Properties, check the box next to Move and size with cells, and also the box next to Print Object. Then, click **Close**.

Now, click File > Print. You will see the preview of the page with the background image on it.

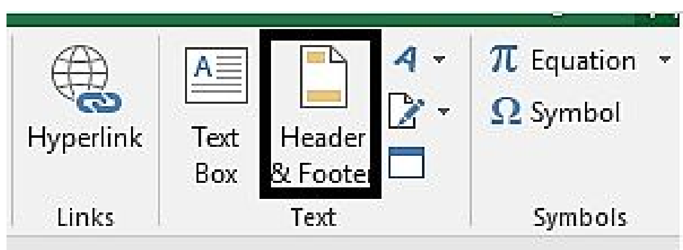
Adding a header or a footer to your reports

A document's header is a text or picture that appears at the top of every page. A header may make your content stand out. Including a header in your papers can save you time when it comes to creating templates since it will display on every page.

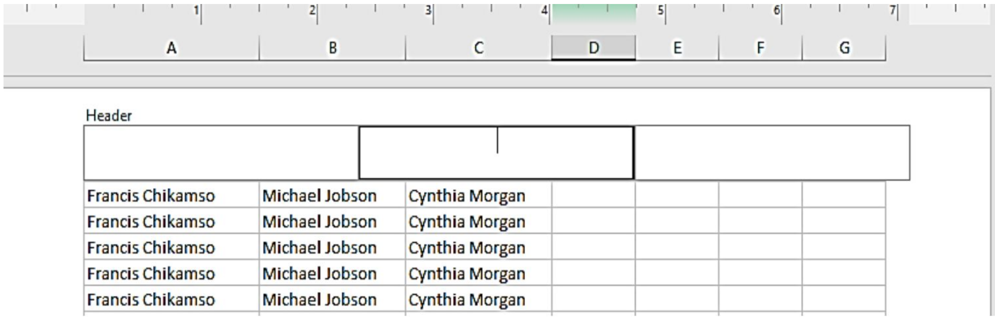
A well-crafted header may pique your audience's interest right away. If you want to be heard, you must first engage your reader. And having a terrific header in your reports and/or articles is one of the most effective methods to hook them.

Inserting a header

Open the Excel file. On the ribbon, click on the Insert Tab. Then, select Header and Footer from the Text Group.

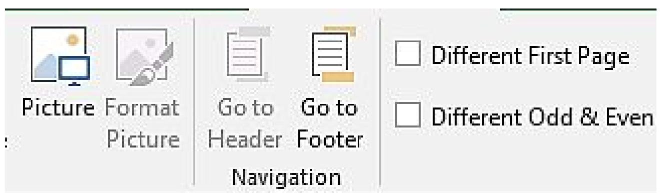


Your worksheet will be displayed in a **Page Layout View**. Now, on the box above the worksheet, enter in the header. By default, you write your header in the center box, but you can also write on the other boxes. Just click on them and write.

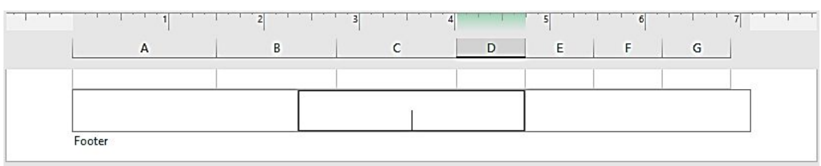


Inserting a footer

A footer is more like a header but this time it is located at the bottom of the page. It is as important as a header. You can add information like your contact address, page number, homepage link, and so on your footer. To insert footer, click on the Insert tab, select **Header, and Footer,** then go to the Navigation group and select **Go to Footer**.

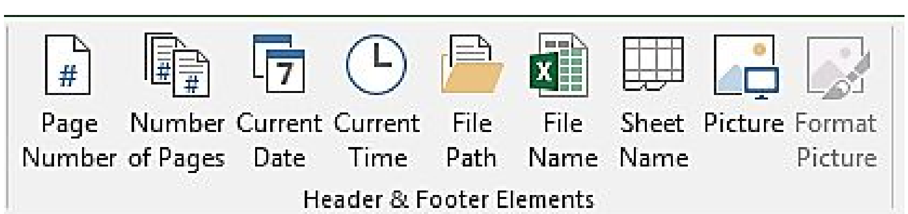


This will lead you to the footer below the page.

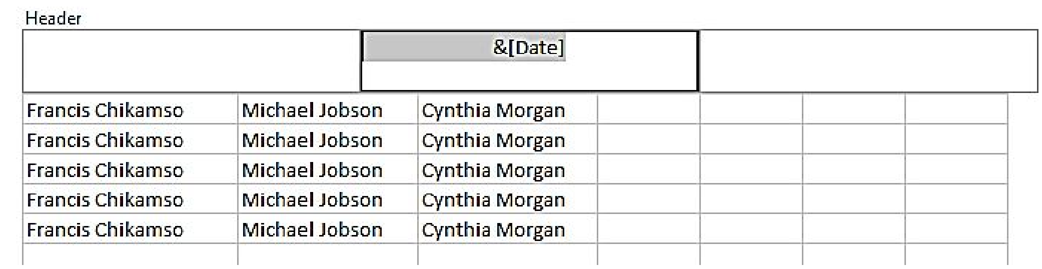


Understanding header and footer element codes

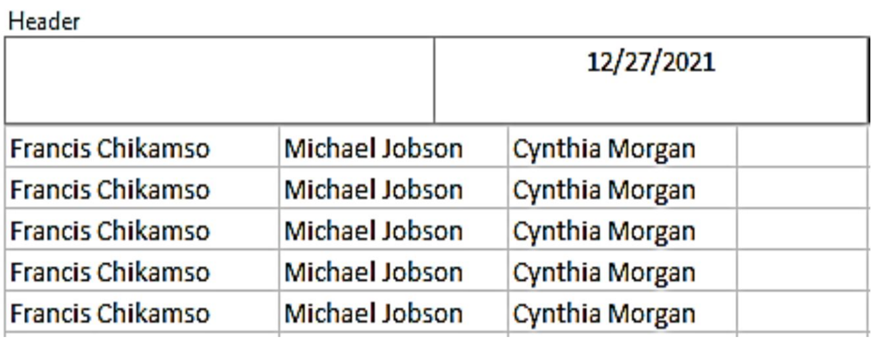
There are elements that you can apply to the header and footer of your page. Some of the elements are File path, Picture, Page Number, Current Date, File Name, Sheet Name, Current Time, and so on. To apply any of them, click on the icon of the elements you want to use.



Let’s say you want to insert the current date on the header, just click on **Current Date**, you will see this **&[Date]** written on the header.

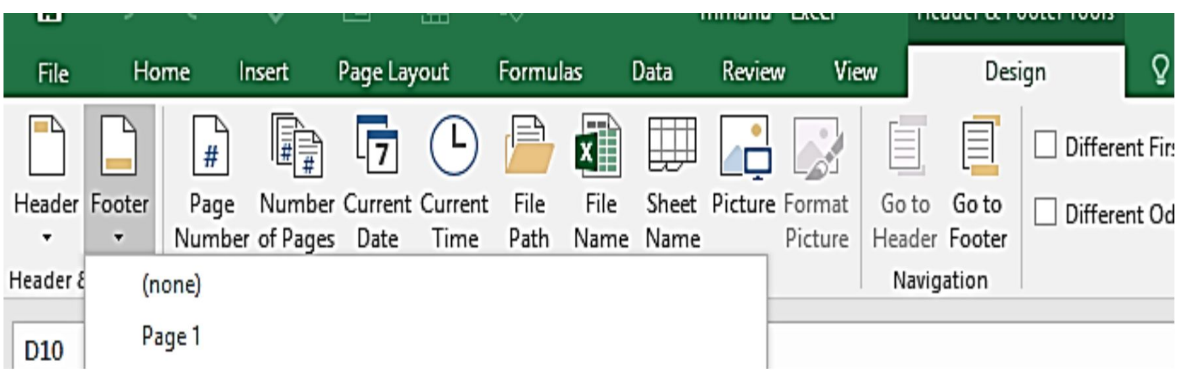


Click on any area on the worksheet to see the current date written there.



Exploring other header and footer options

There are also other options you can make use of. On the Design tab, hit the down arrow on the Header and Footer icons to see the list of headers or footer options.

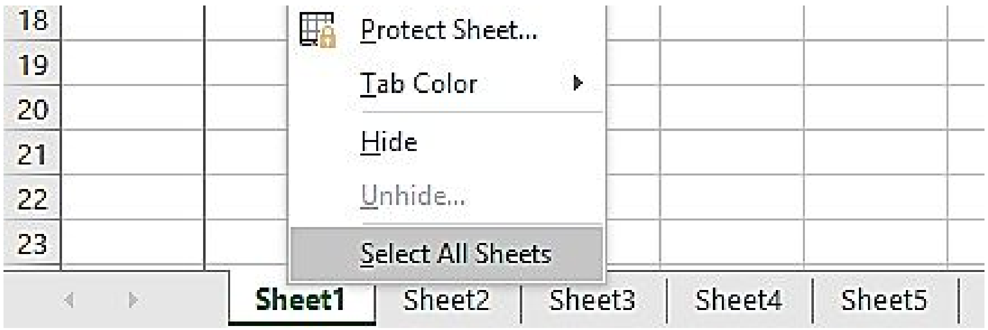


EXPLORING OTHER PRINT-RELATED TOPICS

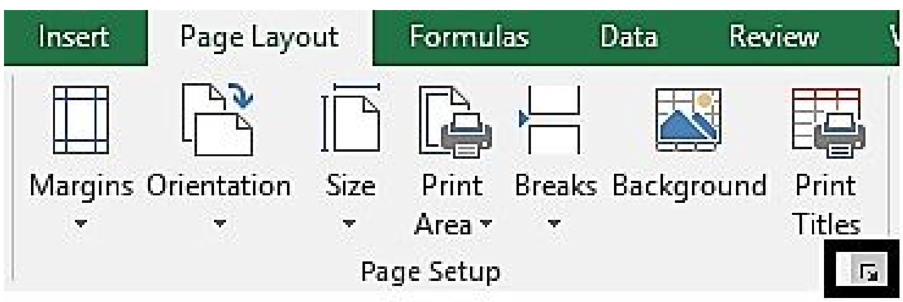
Copying page setup settings across sheets

Say you've got a workbook containing many worksheets, but you wish to make an identical page setup based on a sheet. If you simply have one worksheet, you may quickly set the page setting for it. Also, if you wish to create the same page configuration for additional worksheets in your workbook, doing so one at a time is not a smart idea. Follow the steps below to do so;

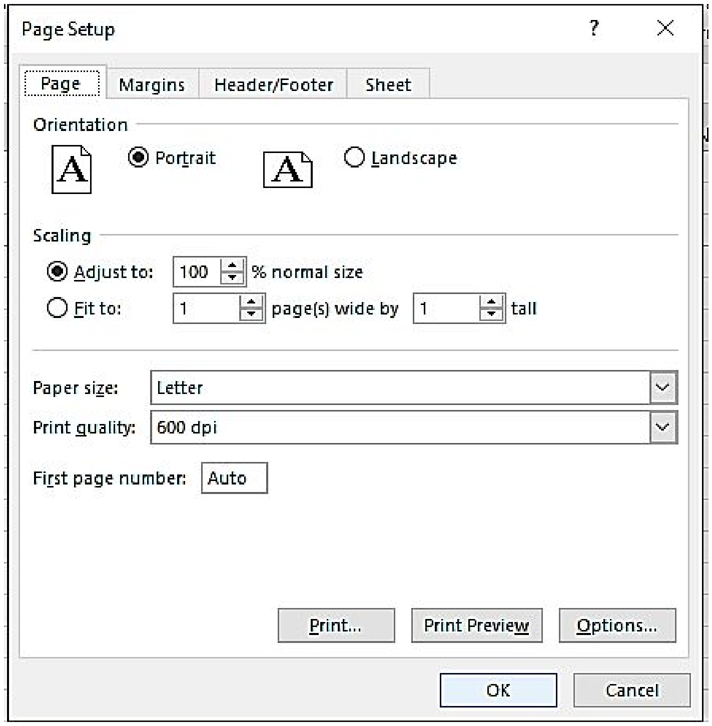
Click on the worksheet tab in which you want to copy the page setup. Right-click and click on Select **All Sheets**.



Click the Page Layout tab. On the Page Setup group, click on the small arrow located at the bottom right of the group menu.



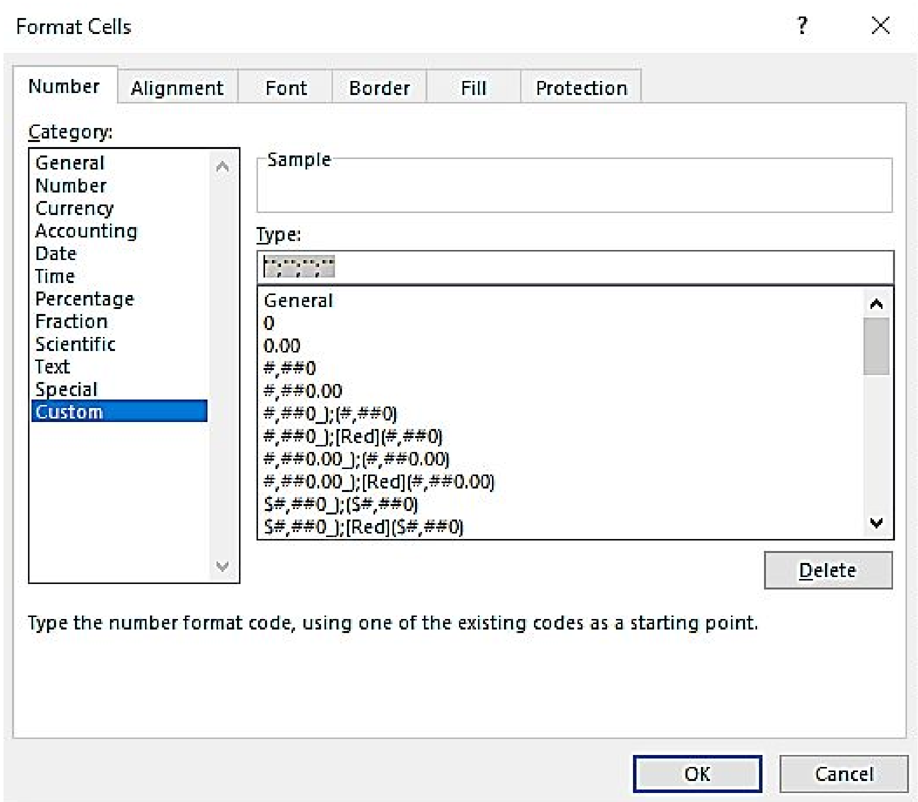
This will open up the Page Setup Dialog box. Then, click Ok. This will copy the page setup of the active worksheet to the selected worksheet.



To ungroup the worksheet, right-click on a tab, then, click Ungroup Sheets.

Preventing certain cells from being printed

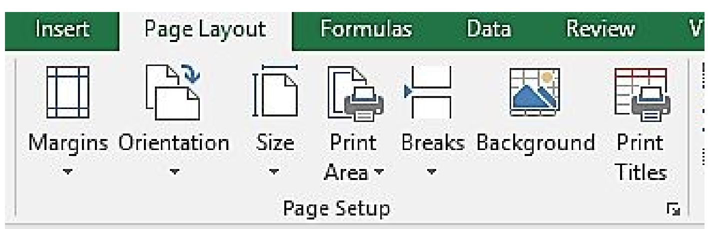
First, click on the cells. Right-click and select Format Cells. You will see the Format Cell dialog box, then click on the Number tab and select Custom. In the type option box, type in this **"";"";"";""**. Then, click Ok. This will hide the contents of that cells.



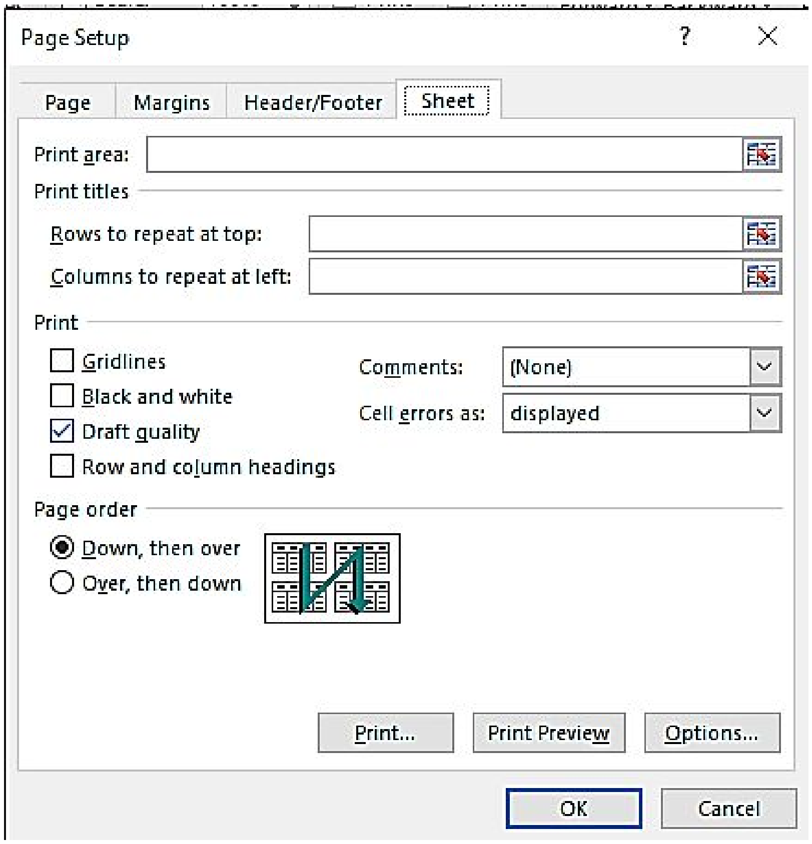
Preventing objects from being printed

You may have objects like boxes, pictures, shapes, etc. on your workbook but don't want to print them alongside other data.

To prevent them, first, click on Page Layout and select **Print Titles**.



Click on the Sheet tab and check the box on the Draft quality option. Click on **Print Preview** to see if the object is on the preview. It will not be available. Then, click Ok.

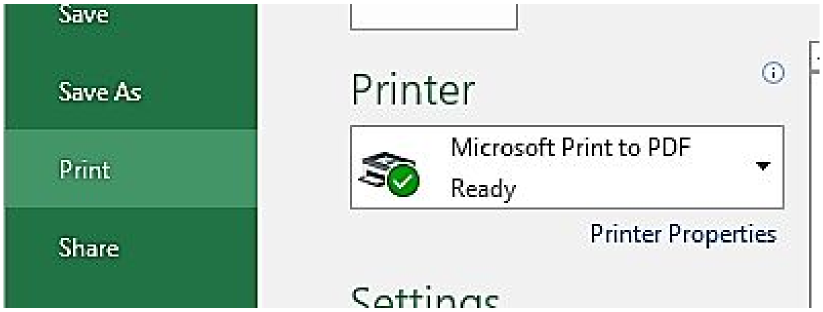


Creating custom views of your worksheet

The custom view helps in making your presentations smooth. To create custom views, simply choose the area on your worksheet for the view. Click View, then select Custom Views. Click Add, enter the name for the custom view. Then, select Ok. To navigate to a view, click on the down arrow on Custom View, then pick a view.

Creating PDF files.

Click on **File** > **Print**. On the Printer option, click the down arrow and select Microsoft Print to PDF. Then, click Print. A menu will appear where you will choose the location for the file and the file name.



Excel print's Limitations

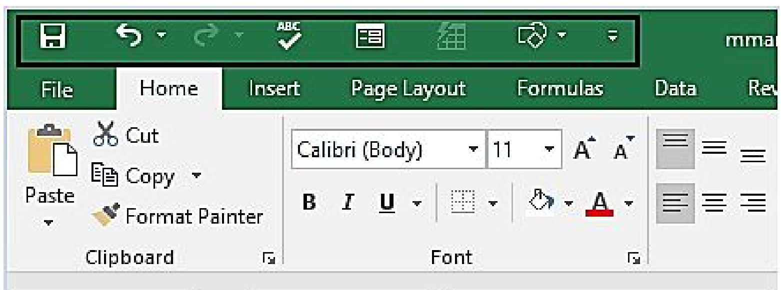
- When your printout is illegible, Excel does not notify you.
- Adjusting the margins from the Preview Pane is difficult.
- It will be difficult to discern cell borders when a user produces a worksheet or a table without gridlines.

CHAPTER EIGHT

CUSTOMIZING THE EXCEL USER INTERFACE

About the Quick Access Toolbar

The Quick Access Toolbar is located at the top left-hand side of the Excel window (above the ribbon) by default. You easily access some tools from there. It saves you time.

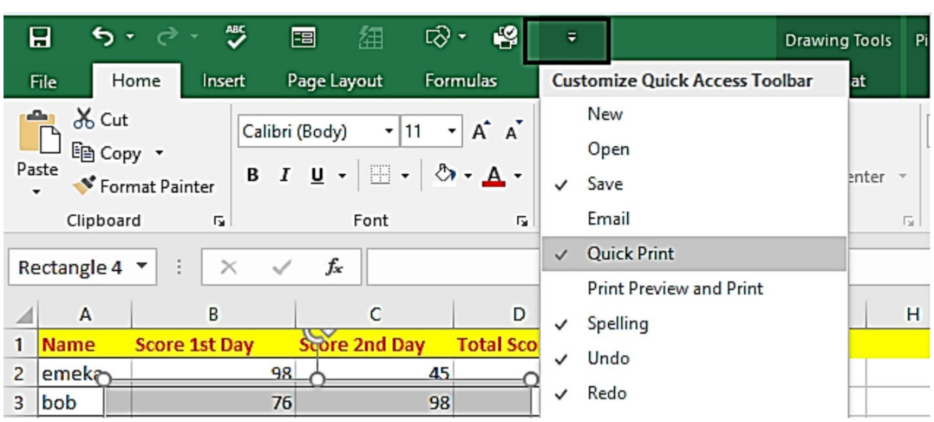


Customizing the Quick Access Toolbar

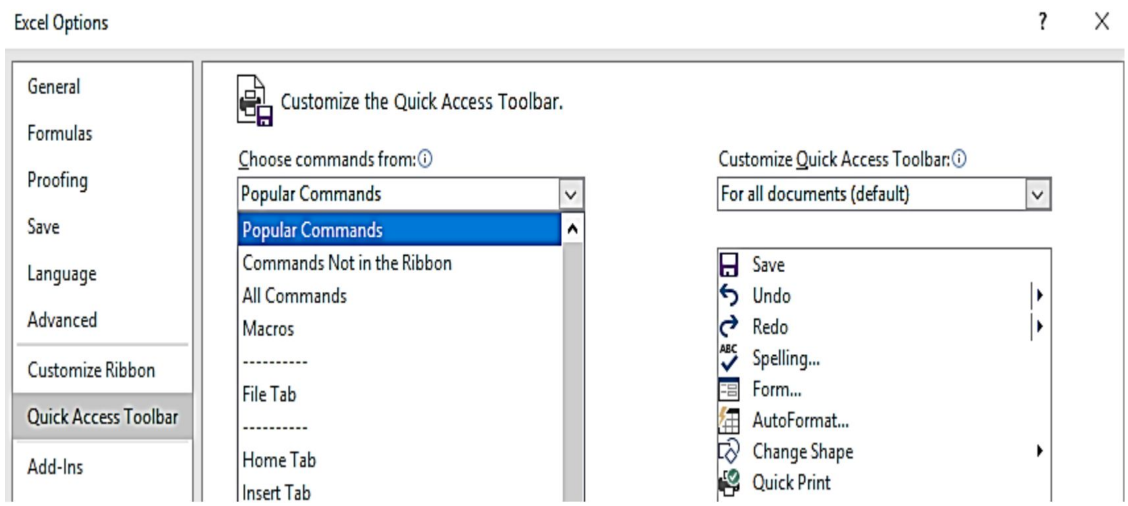
You can make some changes to the default settings of the Quick Access Toolbar. You can add more tools, delete, and even change the position.

Adding new commands to the Quick Access Toolbar

On the Quick Access Toolbar, click the down arrow to see the list of commands. Click on any to add it to the toolbar.

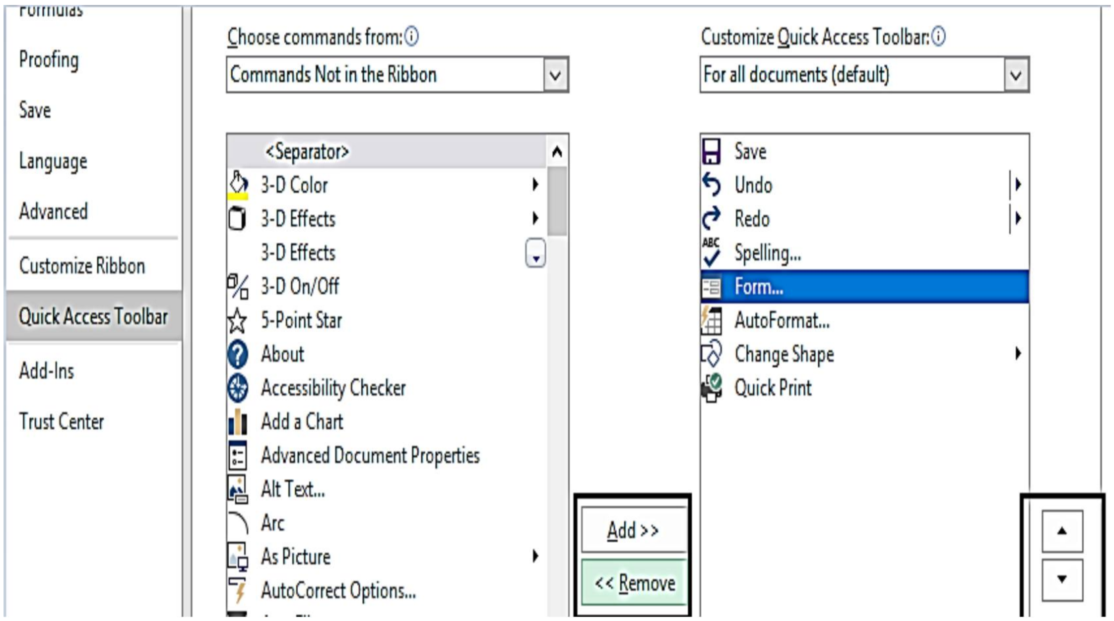


If the command you want to add to the toolbar is not on the list, click on More Commands. This will open up the Excel Options window. On the Quick Access Toolbar menu, you will be the Popular commands listed for you. You can also find other commands. Simply click on the arrow below the Choose Commands from option and select any of the options such as Commands Not in the Ribbon, All Commands, Macros, and others.

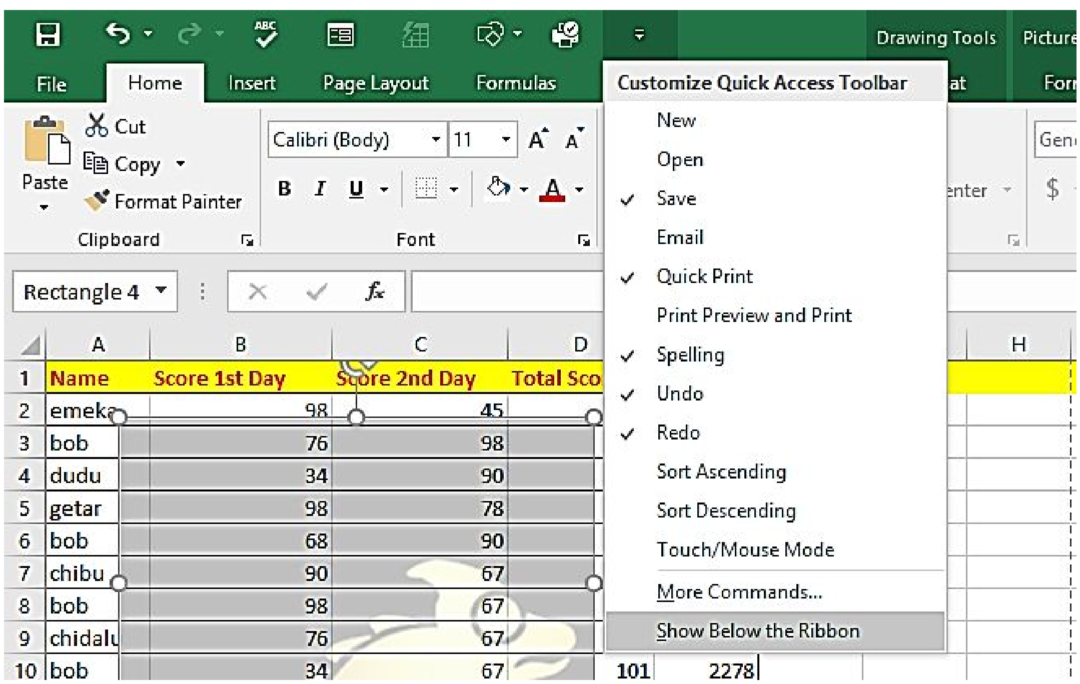


Any of the options you select has a list of commands that you can choose from. Choose the command, then click on **Add>>.** The command will be displayed on the right side of the menu. After you have clicked **Add>>,** click **Ok**. To remove a command, click on the command and then click **Remove**.

You can also rearrange the order of the commands. Simply click on a command, then click the up or down arrow at the right-hand side to move the command above (to the left) or below (to the right).

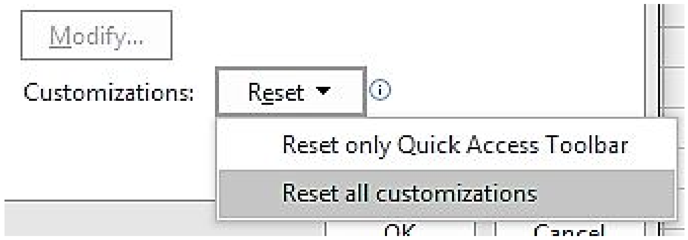


You can also change the position of the Quick Access Toolbar. Simply click on the drop-down arrow and click on Show Below the Ribbon. The Quick Access Toolbar will go down below the ribbon.

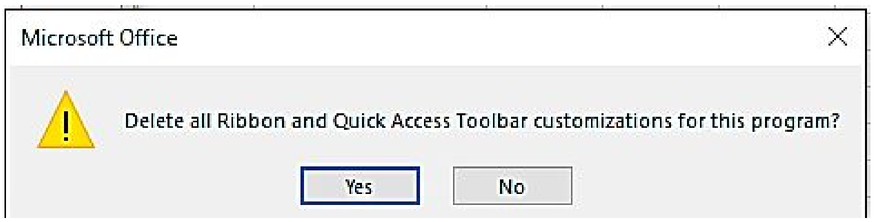


Other Quick Access Toolbar actions

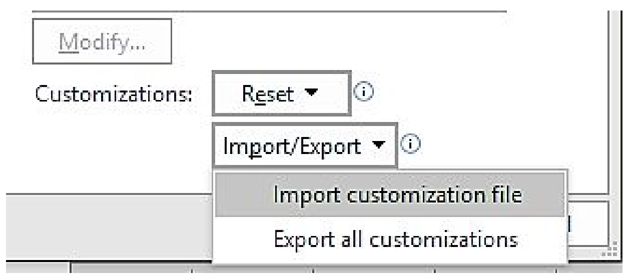
You can reset the customizations you made on the Quick Access Toolbar. When you reset it, all the commands you added will be gone. To do this, right-click on the Quick Access Toolbar and select customize the ribbon. Below the menu, at the right-hand side, click on the drop-down arrow on the Reset option and select **Reset All Customizations**.



A dialog box will appear for you to confirm your action. Click Yes. Then, click Ok.



You can also Import or Export customization files. Simply click on the **Import/Export** option and select an option. When you click Import, it opens up a menu where you will choose the customization file you want to import.



Customizing the Ribbon

This is where you get access to all the commands you are to use when working on your workbook. You can change the settings of the ribbon. You can hide the tabs or show them, add your tab or group to the ribbon, rename groups and rearrange them, and lots more.

Why you may want to customize the ribbon

You may like to have your tab or group on the ribbon. You will like to include those commands that you often use in the ribbon by adding them to a group and building a tab for them so that you can easily access them. You may also want to not display some tabs that you rarely use. Whatever the reason may be, I will guide you on how to do all these.

What can be customized

Yes, the ribbon is customizable but it is not everything on the ribbon that you can customize. Things you can customize in the ribbon are: Showing and Hiding tabs, renaming tabs, adding and removing groups from the ribbon, exporting and importing your customized ribbon, rearranging tabs, custom commands, and groups, and creating a new tab and group.

What cannot be customized

The color of the ribbon cannot be customized, however, customizing the color scheme of the whole Office is possible. Ribbon size, text size, and default icons are not customizable but it is possible to hide the ribbon or customize it to display just the names of the tabs. You cannot change the names, icons on the ribbon. You cannot remove the built-in commands.

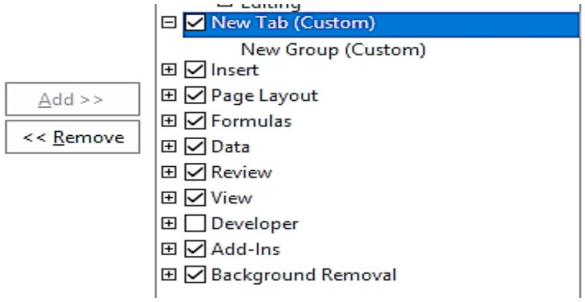
How to customize the ribbon

There are many ways you can customize the ribbon. You can do so using the Customize the Ribbon window. You can create a new tab on the ribbon, create a new group, add commands to the ribbon, and also add commands to the new group you have created.

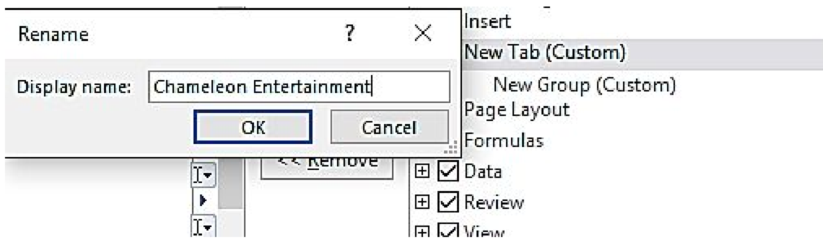
Creating a new tab

To create a new tab, simply right-click on the Quick Access Toolbar and select customize the ribbon. This opens up the Excel Options menu. on the Customize Ribbon option, on the bottom right-hand side of the window, click on **New Tab**.

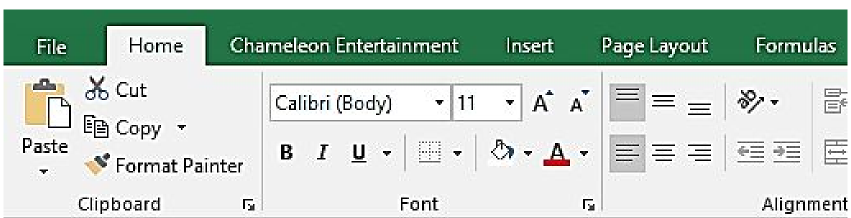
A New Custom tab and a Custom group will be added. The Custom group was added because you can only add commands to custom groups.



Click on the New tab you just created, then select **Rename** to give the tab a name of your choice.

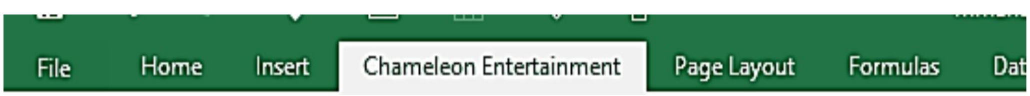


Then, click Ok. You will see the newly created tab on the ribbon.



Creating a new group

As you can see in the image below, the new tab we created has no group in it. Let's create a group on it.

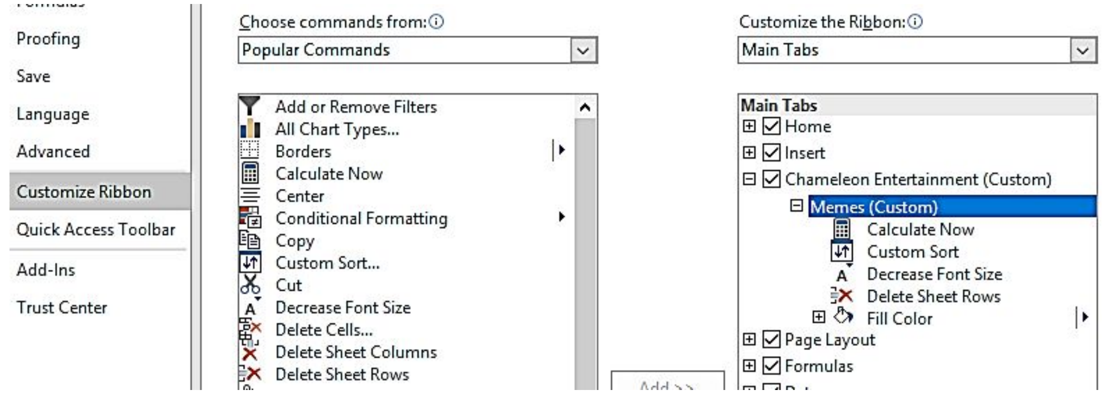


Right-click on the Quick Access Toolbar and select Customize the Ribbon. On the right side of the window, click on the tab for the group (Here, I clicked on Chameleon Entertainment). Click New Group. Click on the Custom Group and select Rename to give it a name and symbol to represent the group when the Excel window is in Restored mode (narrow). Click Ok.

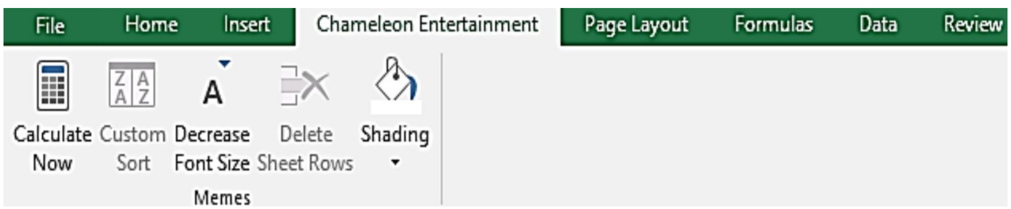
After creating the group, you will first add some commands to the group.

Adding commands to a new group

From the **Choose command**, click on any of the commands you want to add. Click the Add>> button after selecting each command.

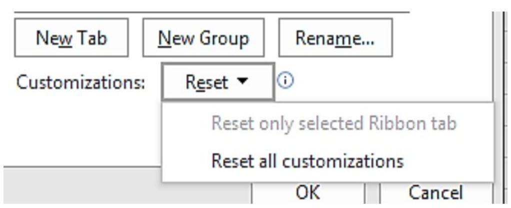


Click Ok when you are done. Now, you will see the new group and the commands in it on the tab.



Resetting the ribbon.

After making some customizations, you can change back the ribbon to its default settings. Simply navigate to the Customize Ribbon Window. At the bottom left side, click the down arrow on the **Reset** option and select **Reset all Customizations.**



CHAPTER NINE

GETTING STARTED WITH EXCEL CHARTS

What's Chart

The chart is commonly referred to as a graph in Microsoft Excel. It's a visual depiction of data from a spreadsheet that could help you comprehend the information better than simply looking at the numbers.

A chart is a tool for graphically displaying data in different chart layouts like Line, Pie, Surface, Bar, Scatter, Column, etc.

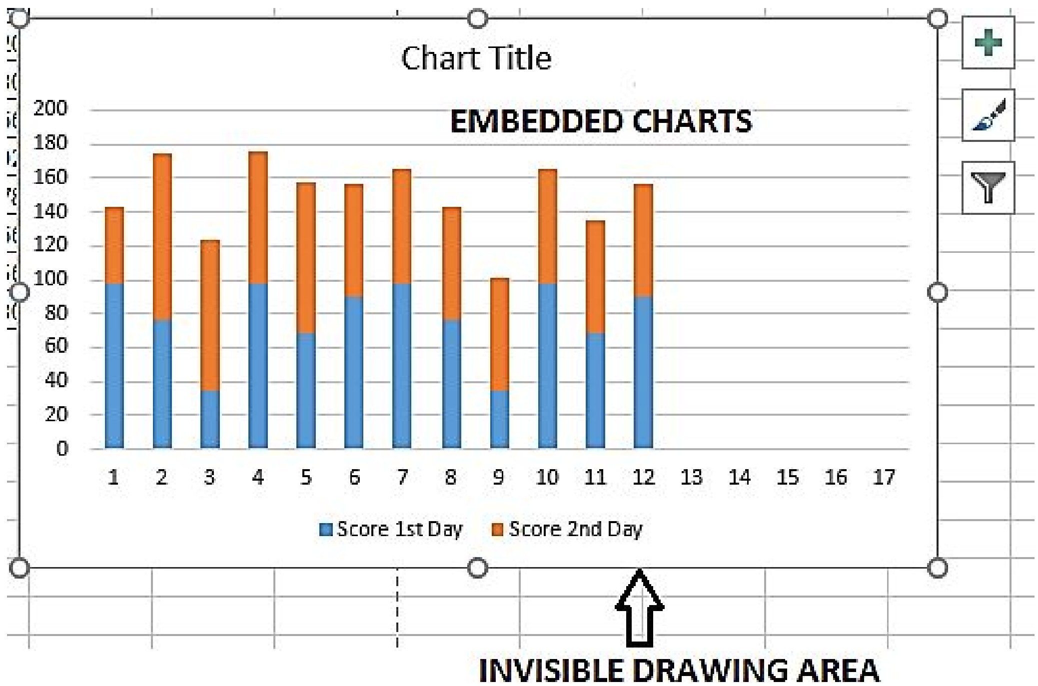
How Excel Handle charts

Charts provide a pictorial depiction of any data collection. A chart is a visual description of data that uses symbols like columns in a column chart to describe the data. You may pick from the list of chart kinds in Excel, or utilize the Excel Recommended Charts option to see charts that have been created for your data.

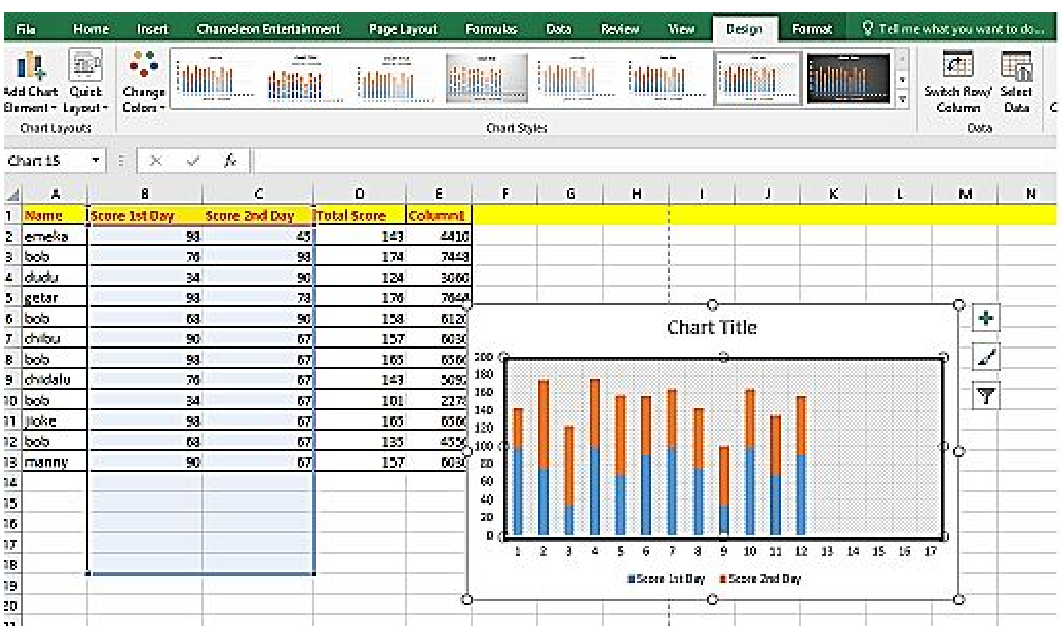
In Excel, the data which you are to use in creating a chart is the one in your worksheet. However, you can use data from other worksheets or another workbook. The Charts in Excel are not static i.e. you can make changes to them anytime and anyhow you want.

Embedded charts

The charts you make in an Excel Worksheet are embedded charts. It stays on the worksheets. On a worksheet, is see an invisible drawing layer, which is where embedded charts are displayed.



Just like other objects, you can change the position of an embedded chart, resize an embedded chart, change the properties, make changes to the borders, and so on. To make changes to the chart, simply click on the chart. The chart will be activated, then on the ribbon, the Design and Format tab comes up. With those tabs, you can make changes to the embedded chart.

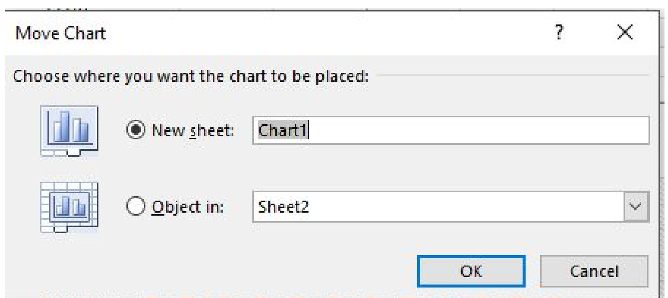


When you create a chart in Excel, by default, it is created as an embedded chart.

Chart sheets

Chart Sheet is the sheet that holds a chart in your worksheet. It is just like a worksheet just that worksheets contain both the data and your chart while chart sheets contain just a chart. An embedded sheet is always on the chart sheet. Just like how worksheets are called Sheet 1, Sheet 2, so are chart sheets called Chart 1, Chart 2, etc.

You can change the position of an embedded chart to a chart sheet. A chart sheet can be an embedded chart. Simply click on the embedded chart, click on the Design tab and select Move Chart. A dialog box will appear. Check the New Sheet option. Put in a name for the chart sheet if you want. Then, click Ok.



Parts of a chart

A chart is made up of different parts. When you create a chart in Excel, you will see the different parts of it located on the right side of the chart.

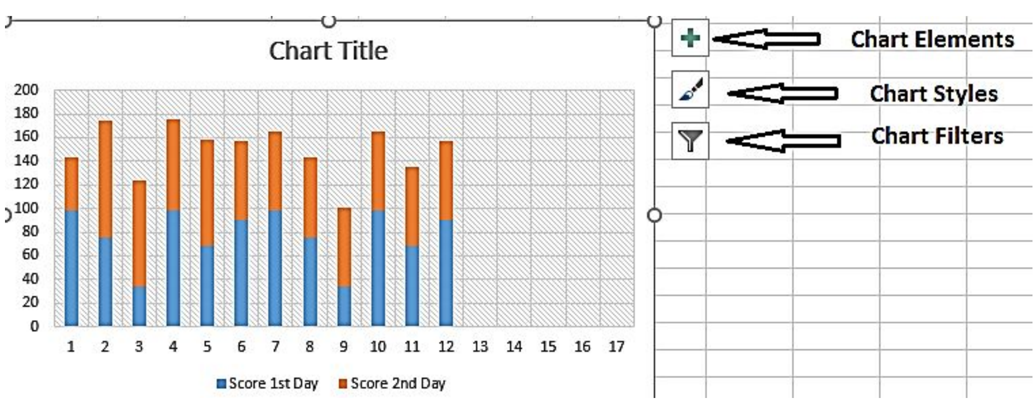
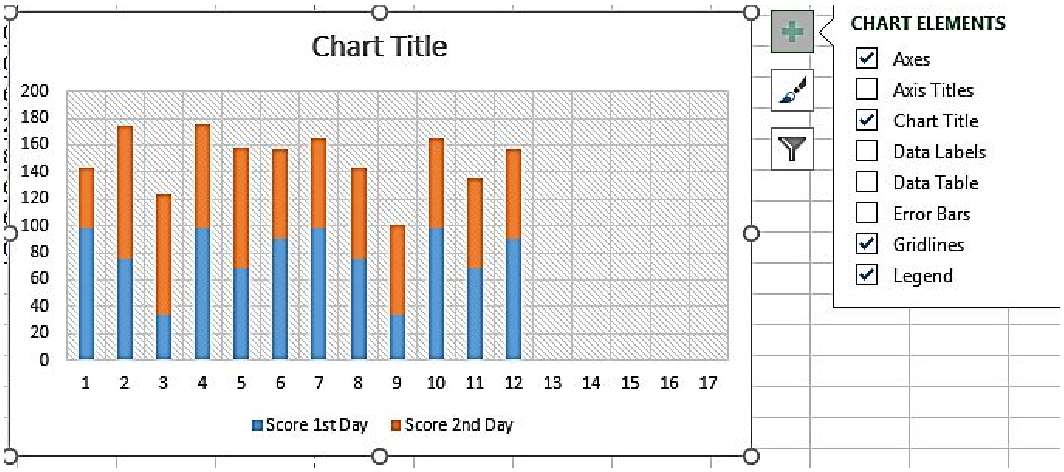
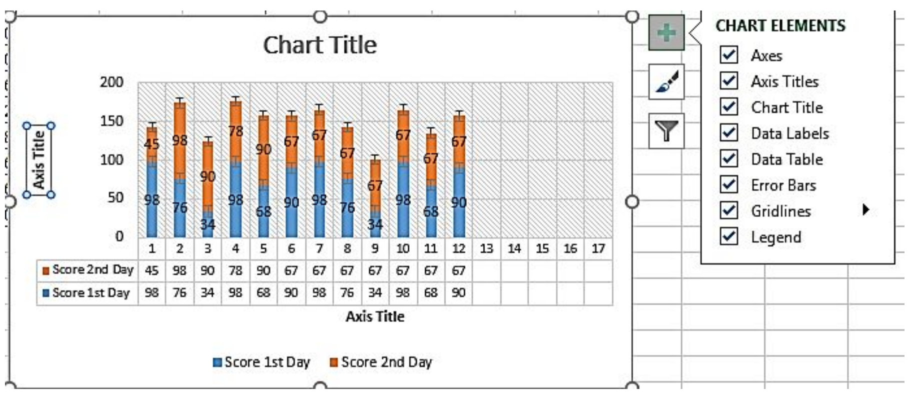


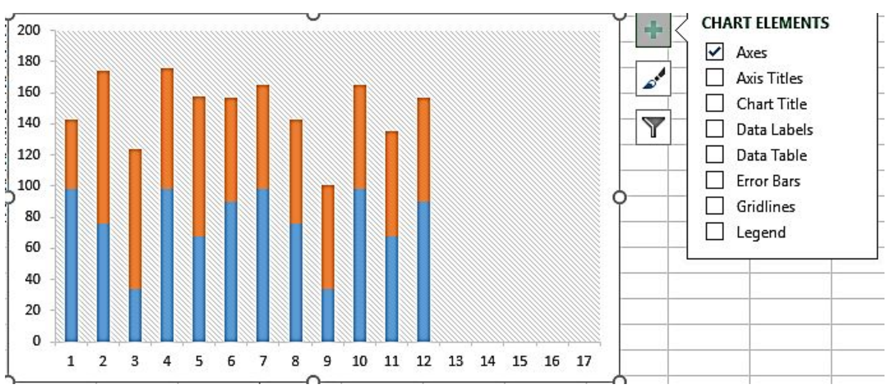
Chart Elements: These are parts of a chart that give more description to your chart. They make your data have detailed meaning. When you click on the chart element icon, you will see a list of different elements such as Axes, Axis title, Chart title, Gridlines, Legend, etc.



When you check the box beside each of the elements, the preview of the element will be displayed on the chart. As you can see in the image below, I checked all the boxes and the preview of it is displayed on the chart.



Axes: A chart has two which are the **Vertical axis** (**Y-axis**) and **Horizontal axis** (**X-axis**).



Axis Titles: This gives more understanding feature of the data in the chart. You can add them to any vertical, horizontal, or depth axes in the chart. You can’t add them to charts that do not have axes like doughnut charts or Pie charts.

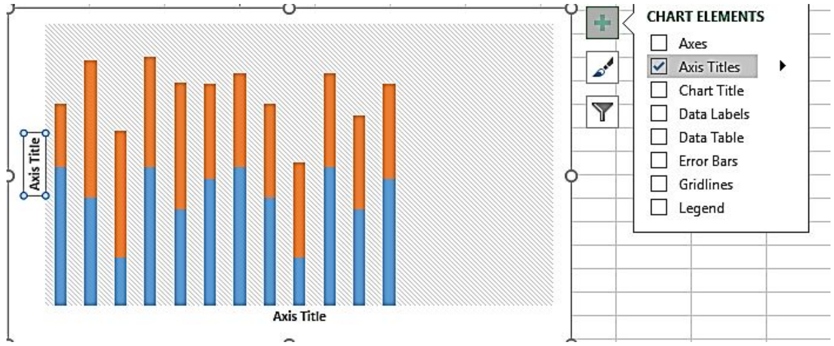
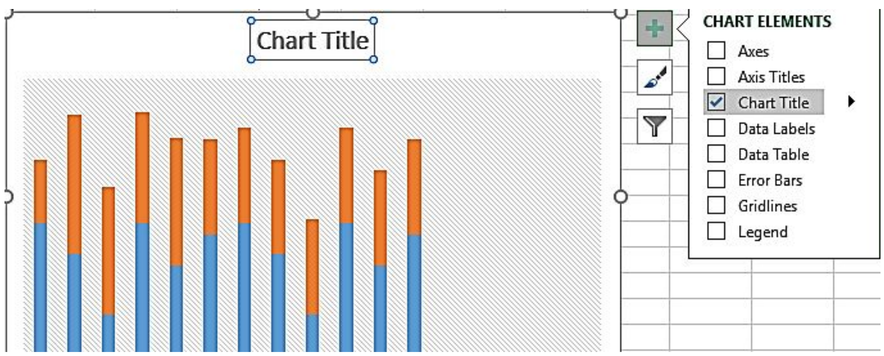
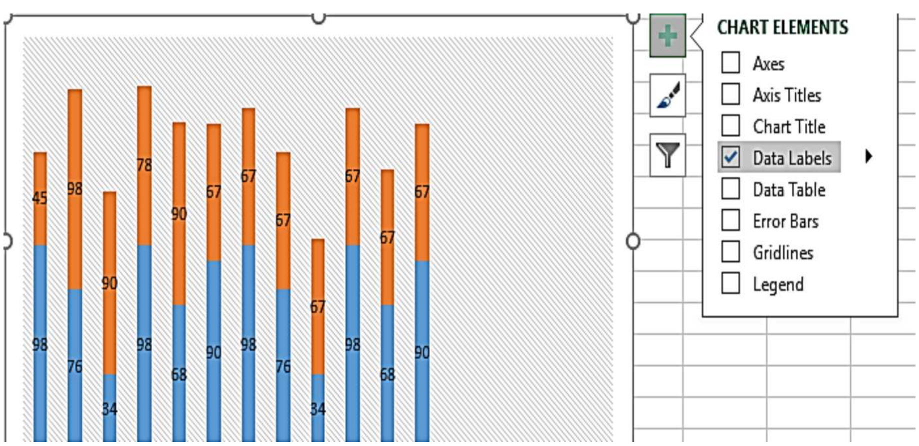


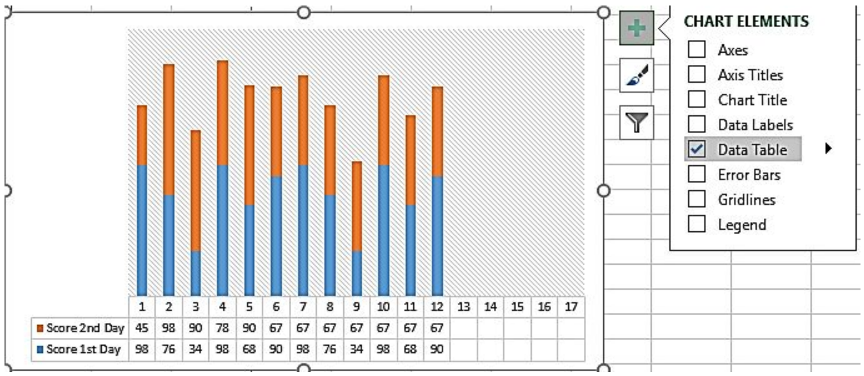
Chart title: This is the title of the chart you have added. It appears by default on top of the chart sheet. Click on the chart title to edit it.



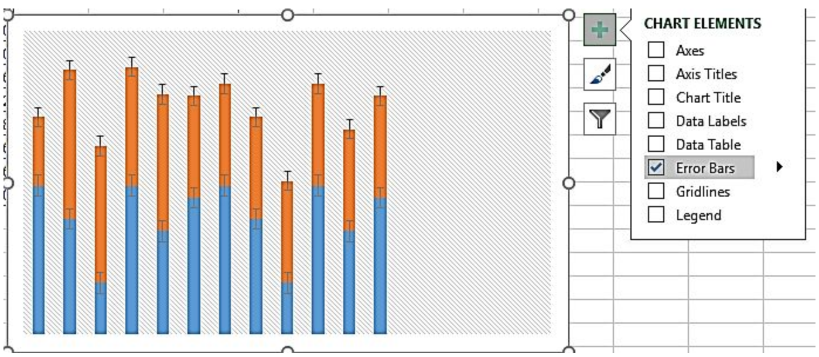
Data labels: This shows the details of a data series or data points. It makes your chart to be easily understood by the readers or viewers.



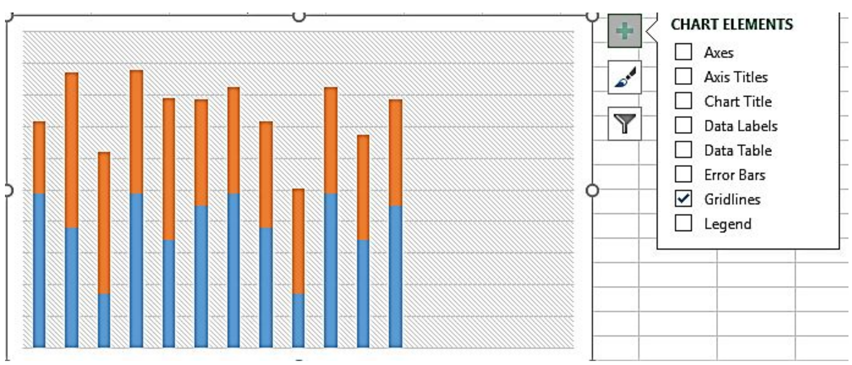
Data table: This displays the table of the data for the chart.



Error Bars: Displays the possible error amounts comparatively to every data marker in a data series.



Gridlines: This makes the data easy to comprehend.



Legend: Displays the rows or columns on which the chart is created on. It also gives it a special representation with the use of different colors to describe them.

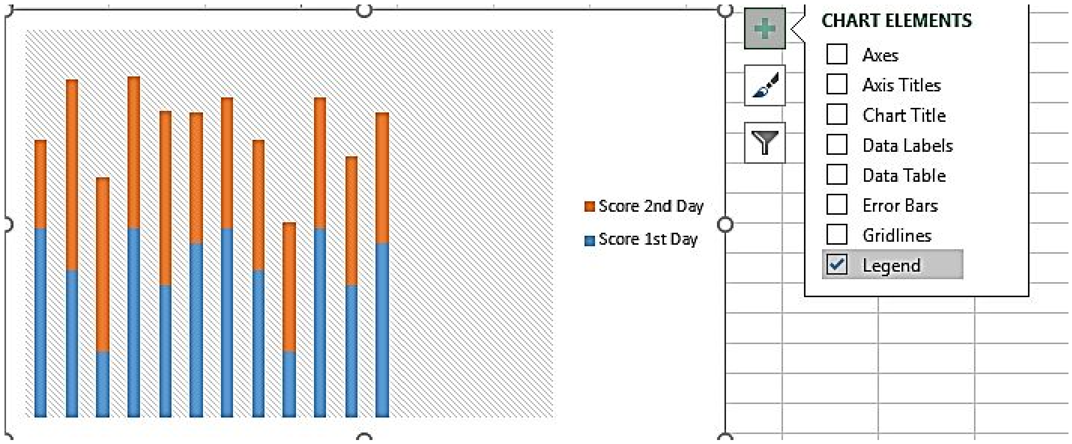


Chart limitations

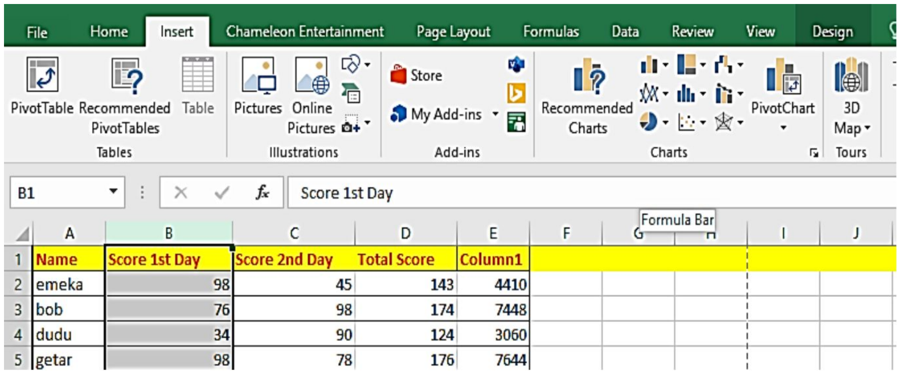
The amount of series available in a chart in Excel 2010 has stayed the same as in previous versions, 255, but the number of points in a series has expanded substantially, from 32,000 to 1,048,576, allowing whole columns in Excel 2007 and 2010 to be utilized as the source data for a chart series.

Because the prior restriction of 256,000 points is less than the new maximum of points per series, the total number of points permitted in a chart has risen. I didn't have time to test this limit since drawing a series with a million points takes over a minute. (Hmm, I'm not sure whether the help files have been updated with the new restrictions yet.

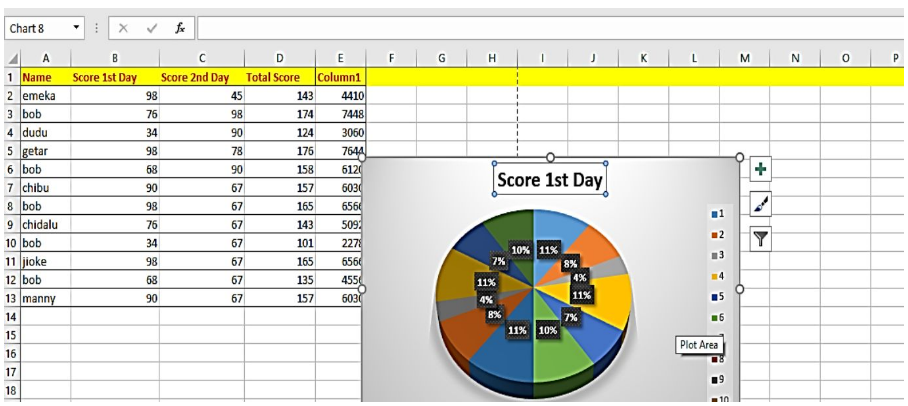
BASIC STEPS FOR CREATING A CHART

Creating the chart

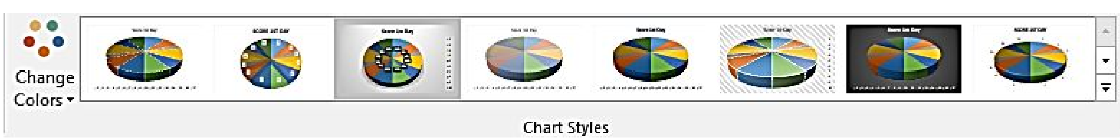
To create a chart, simply select the cell (s), row, or column that you want to make a chart for. Then, click Insert on the ribbon. You will see the Chart group in the Insert tab.



So, select the type of chart you want to use from the list of charts there. Click on the drop-down arrow for each chart icon to see the different chart styles. You can also click on Recommended Charts to select another chart style. So, click on a chart and it will be displayed on your worksheet. The chart represents the data of the selected area in the worksheet.

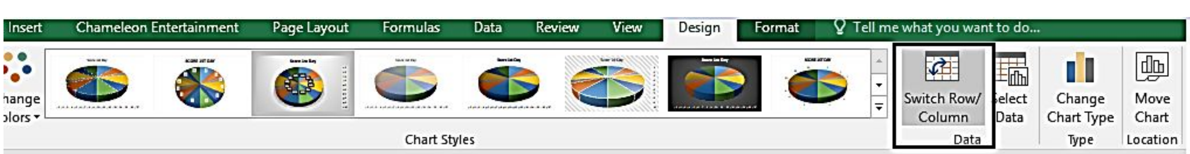


On the ribbon, you can change the chart style for the chart on your worksheet.



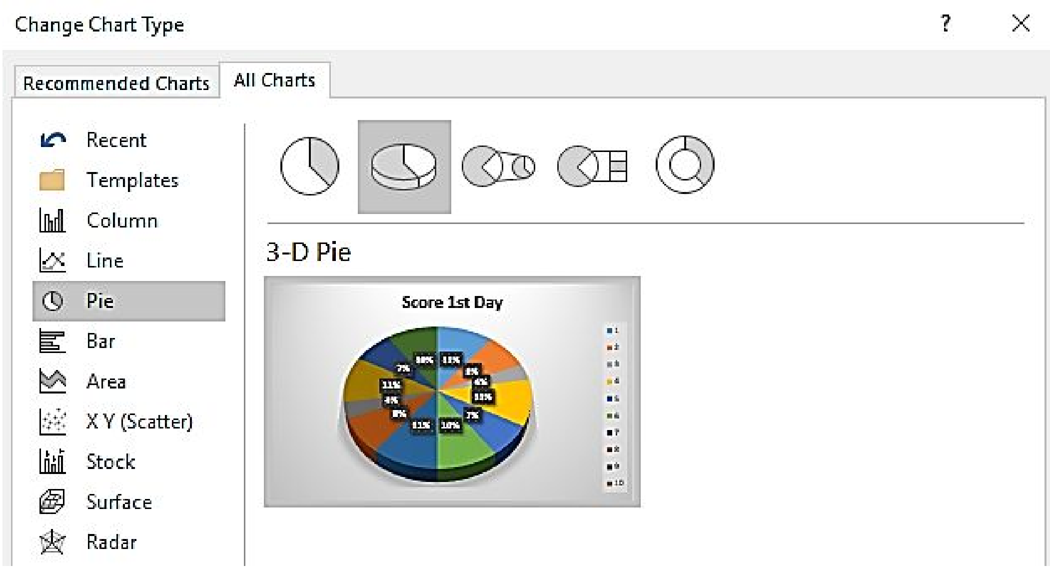
Switching the row and column orientation

After adding your chart, you can switch the row and column. Simply click on the Switch row and column icon on the ribbon.

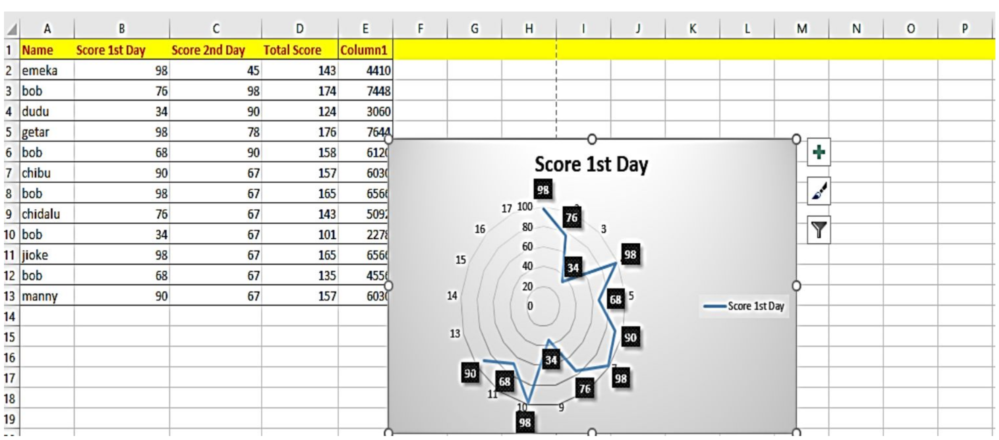


Changing the chart type

Click on Change Chart Type in the ribbon. This opens up the Change Chart Type menu. on it, you will see the list of different chart types.

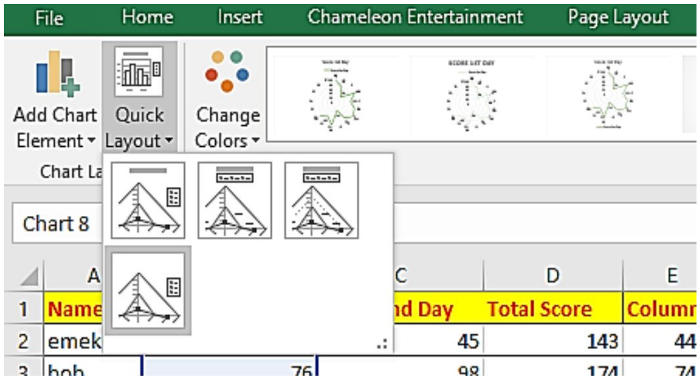


Click on the one you want to change the chart type to and select Ok. The chart will change on your worksheet.



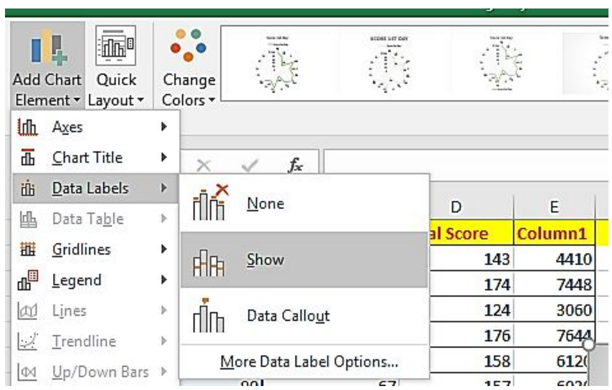
Applying chart layout

At the left side of the ribbon is the Chart Layout group. Click on Quick Layout, then select a layout.



Adding and deleting chart elements

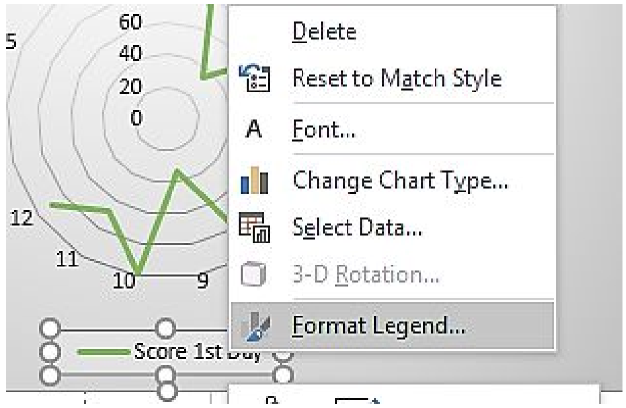
Chart elements provide extra information to your charts, making them more relevant and attractive to the eye. Click on **Add Chart Elements** and select an element.



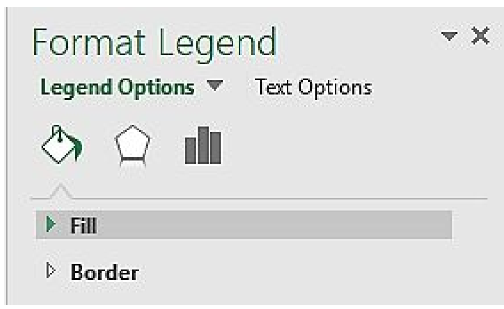
To delete, right-click and select **Delete**.

Formatting chart elements

To format the elements, right-click and select Format (the name of the element you added comes after Format).



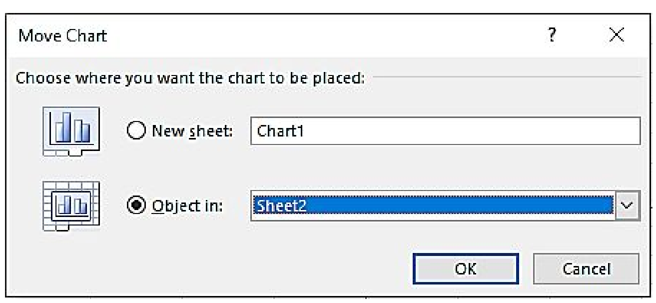
On the Format Pane menu, click on an option.



MODIFYING AND CUSTOMIZING CHARTS

Moving and resizing a chart

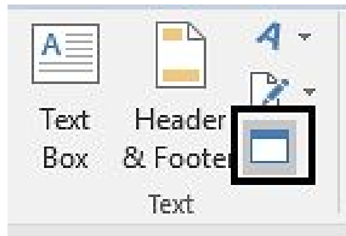
To move a chart, click the chart, then drag it to anywhere to want to place it. To resize it, put the cursor on the chart edge, then drag it up, down, or sideways. You can also right-click on the chart, then select **Move Chart**. This opens a dialog box.



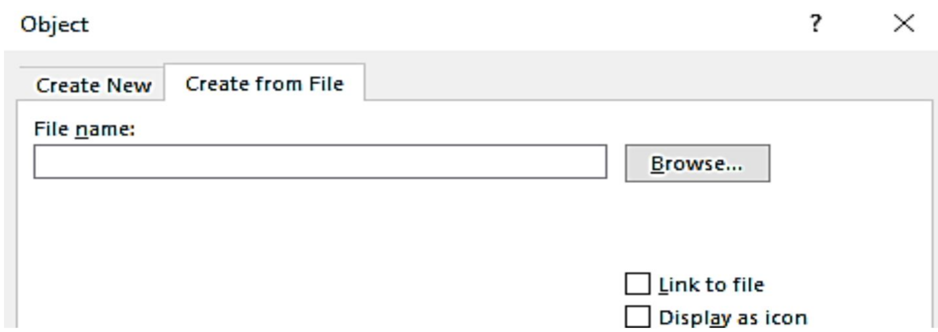
Converting an embedded chart

We can connect a chart in Excel and the data in a Word document together using Embed in Excel. When linking them, any changes you apply in the chart will also be applied on the Word document automatically only if they are saved in a similar folder or location. Follow the steps to do so.

On the Insert tab, then select **Object** from the Text group.



Click on **Create from file** tab and select **Browse**.



Find the file (chart) and choose Insert. Check the box on **Link to File**. Then click **Ok**.

To edit the embedded chart, simply double-click on it. the Excel worksheet which contains the chart will open. make your edits and ensure you save them after editing in Excel.

Copying a chart

Simply right-click on the chart, select Copy. Then, navigate to where you want to paste it and right-click, then select **Paste**.

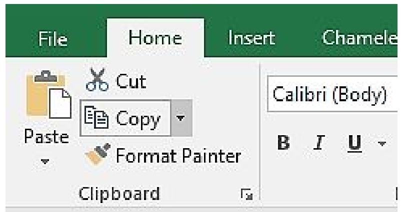
Deleting a chart

Click on the chart, then Press the **Delete key** on your keyboard.

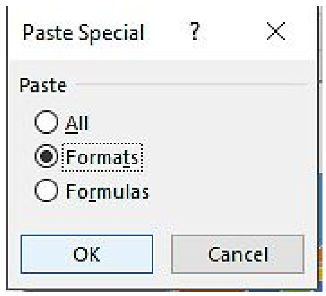
Copying a chart formatting

First copy the chart. You can click on the chart and press **Control key + C** or you right-click and select **copy**.

Then, click on the chart you want to format. On the clipboard group, click the down arrow on the Paste icon and select Paste Special.

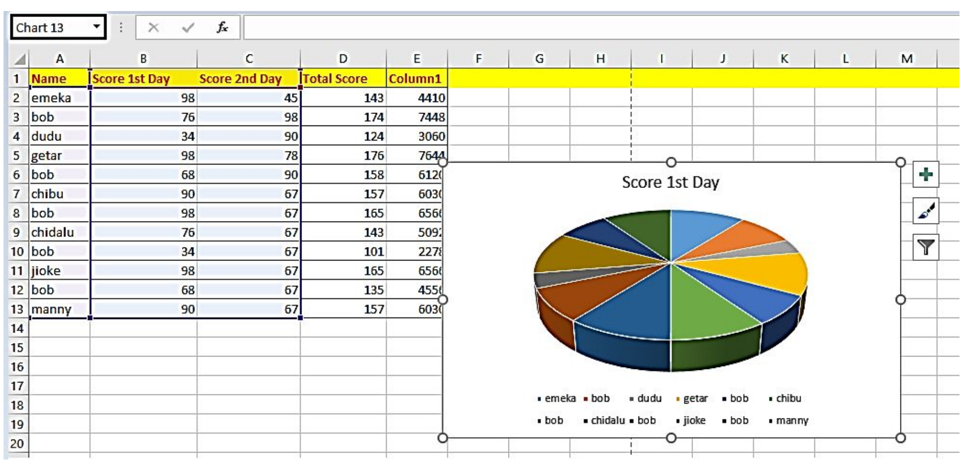


Check the **Format box**. Click Ok.

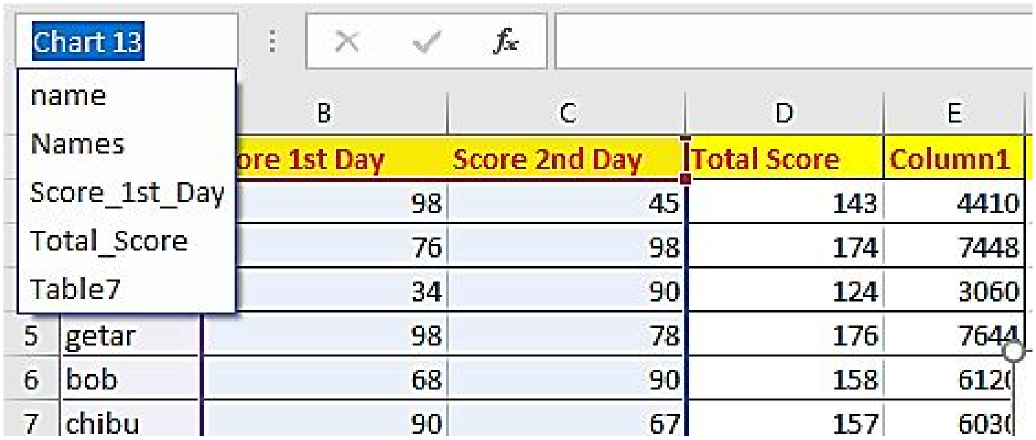


Renaming a chart

You might well have observed that when Excel generates a chart, it assigns it a specific number. It is found in the Name Box on top of the grid in the left corner. You have the option of changing the name to something more informative to you.

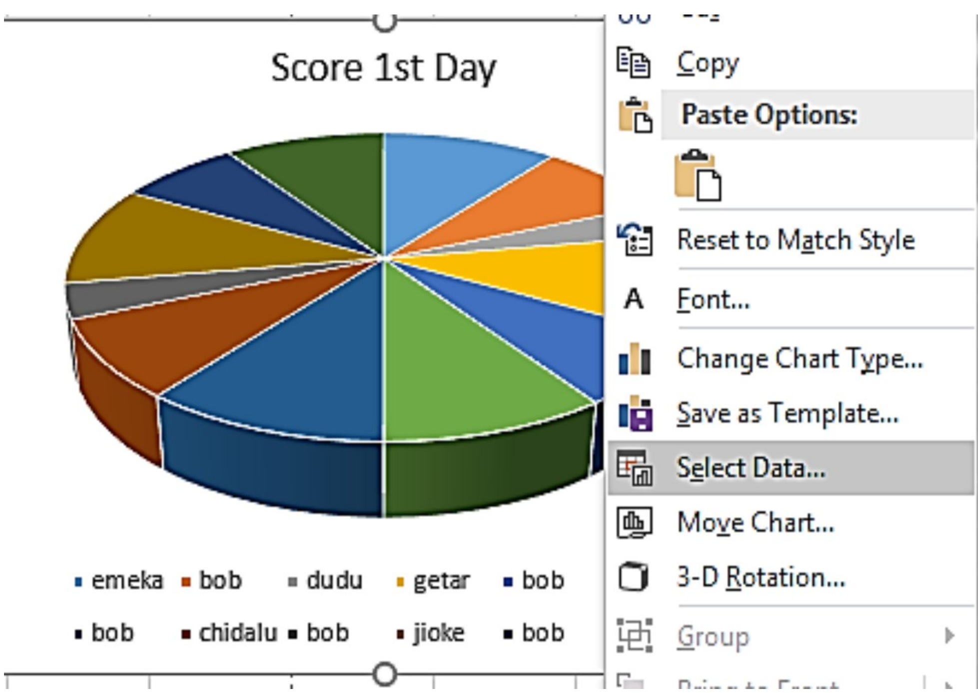


There are ways to rename a chart. First, click the **Name box**, then, type in the name for the chart.

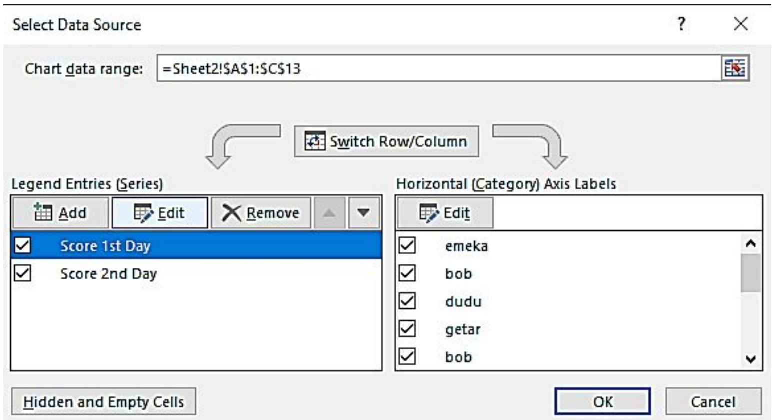


Renaming a data series in a chart

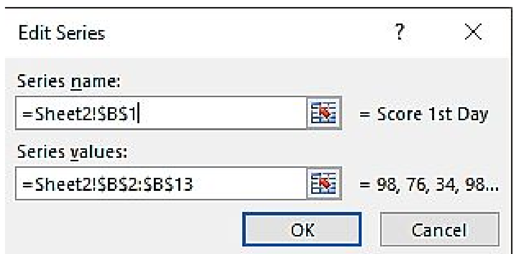
Simply right-click on the chart and click on Select Data.



This opens up the Select Data window. So, highlight the data series you want to rename. Click Edit.



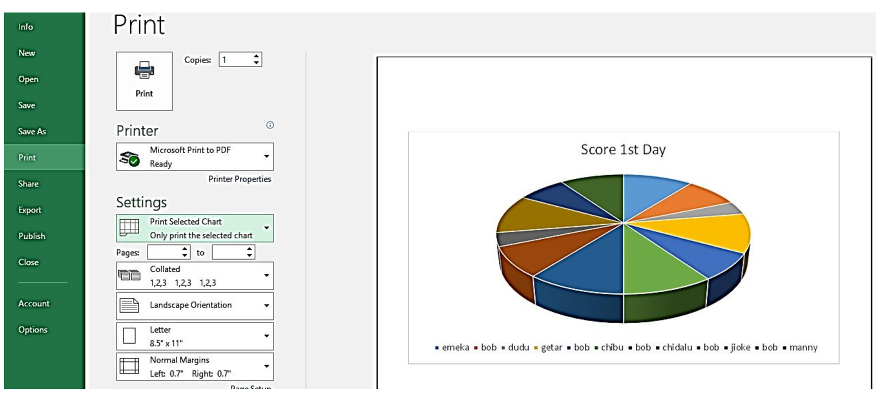
The Edit Series dialog box will appear. On it, remove the names on the type-in box and put in the name you want for the chart. Click Ok.



Click **Ok** again.

Printing charts

Choose the chart. Click on File and select Print. On the **Printer** option, select a printer. Then, on the **Print Setting option**, make sure it is set to Print Selected Chart, though it will be there by default. Click **Print**.



UNDERSTANDING CHART TYPES

Choosing a chart type

In Excel, there are different kinds of charts. You have a list of charts that you can use when working on your worksheets. There are also sub-types of these charts. Below are the charts;

Column charts

In a Column Chart, the horizontal (category) axis is used to show the categories, while the vertical (value) axis is used to display the values. Arrange the data in columns or rows on the spreadsheet to make a column chart. The sub-types of the column chart are;

- 3-D Column
- 3-D 100% Stacked Column
- Clustered Column
- 100% Stacked Column
- 3-D Clustered Column
- 3-D Stacked Column
- Stacked Column

Bar charts

Individual item comparisons are shown using bar charts. The data are grouped along the horizontal axis and the categories are arranged along the vertical axis in a Bar Chart. Organize the data in columns or rows on the Spreadsheet to Make a Bar Chart. The sub-types are

- Clustered Bar
- Stacked Bar
- 100% Stacked Bar
- 3-D Stacked Bar
- 3-D Clustered Bar
- 3-D 100% Stacked Bar.

Line charts

Line charts are used to show trends over time. It can be over years, months, and days. It is also used to display categories when the order is not important. You can utilize this chart when you have lots of data points on your worksheet and the order is important. The sub-types are

- Line
- Stacked Line
- 100% Stacked Line
- Line with Markers
- Stacked Line with Markers
- 100% Stacked Line with Markers
- 3-D Line

Pie charts

This is a circular chart. It is a sort of graph that depicts the information in a circular graph. The slices of pie illustrate the data's apparent size and are a sort of graphical representation of data. A list of categories and numerical variables is required for a pie chart. The phrase "**pie**" refers to the entire, whereas "**slices**" refers to the individual components of the pie.

It is divided into different sectors in which each of them represents a part of a whole. The number of elements in one data series is equivalent to the total of the elements in a pie chart. In a pie chart, the data points are shown as a proportion of the whole pie. Arrange the data in one column or row on the spreadsheet to Make a Pie Chart. The sub-types are

- Pie
- 3-D Pie
- Pie of Pie
- Bar of Pie

XY (scatter) charts

XY (Scatter) charts are often used to display and compare quantitative quantities, such as data from science, statistics, and engineering. There are two Value Axes in a Scatter chart.

- Axis of Value Horizontal (x)
- Axis of Vertical Value (y)

It merges x and y values into a singular data point and shows them in clusters of irregular intervals. Organize the data in rows and columns on the spreadsheet to make a Scatter chart. The X values should be in one row or column. The y values should be in the adjacent rows or columns.

When in doubt, use a scatter chart when:

- You wish to adjust the horizontal axis scale.
- You should use a logarithmic scale for that axis.
- The horizontal axis values are not equally distributed.
- On the horizontal axis, there are a lot of data points.
- To expose additional information about data that comprises pairs or grouped sets of values, you wish to modify the independent axis scales of a scatter chart.
- Instead of showing disparities between data points, you want to illustrate commonalities across big amounts of data
- You wish to compare a large number of data points over a long period.
- The more data you put in a scatter chart, the more accurate your comparisons will be.

Area charts

Area charts are useful for plotting changes over time and highlighting the entire value throughout a trend. An area chart displays the connection of parts to a whole by displaying the total of the plotted data. Arrange the data in columns or rows on the spreadsheet to make an Area Chart. The sub-types are

- Area
- Stacked Area
- 100% Stacked Area
- 3-D Area
- 3-D Stacked Area
- 3-D 100% Stacked Area

Radar charts

The average values of many data series are compared using radar charts. Organize the data in columns or rows on the worksheet to create this chart.

Surface charts

A surface chart comes is helpful when you want to combine two sets of data. Colors and patterns, much as on a geographical map, identify regions with similar values. To make a Surface chart, make sure that the categories and data series are both numeric values and organize the data on the spreadsheet in columns or rows.

Bubble charts

A Bubble chart is like a Scatter chart, only that it has a third column that specifies the size of the bubbles that indicate the data points therein the data series.

Stock charts

Stock charts, as the name indicates, may depict price movements in stocks. A Stock chart is used to display changes in other data, such as rainfall intensity or yearly weather.

Organize the data in columns or rows in a specified arrangement on the spreadsheet to make a stock chart. To make a basic high-low-close Stock chart, for example, organize your data with High, Low, and Close as Column headers in that sequence.

NEW CHART TYPES FOR EXCEL

Histogram charts

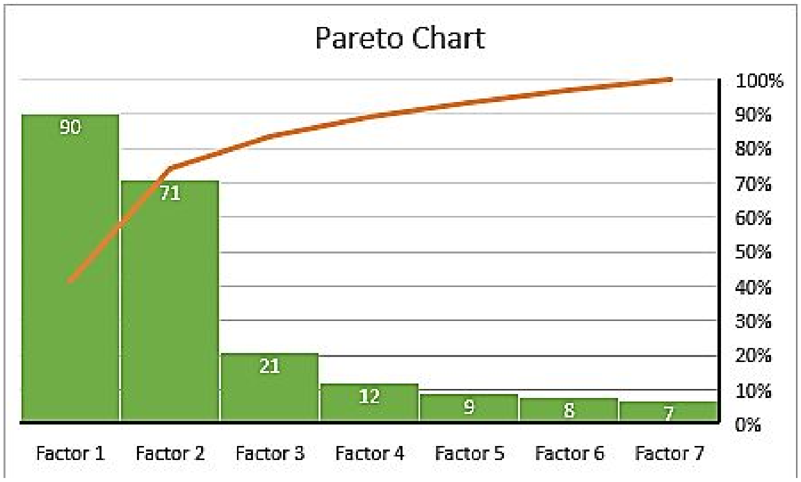
A histogram is a graphical illustration of numeric values distribution. A histogram is a kind of column chart that displays the frequency of data in a certain range in a more straightforward manner. It uses the number of data points that fall inside a specific range of values to visualize numerical values. It uses vertical columns to display the frequent increase and fall in data. In Excel, a histogram chart is divided into five sections which are **Title**, **X-axis, Y-axis, The bars,** and **Legend.**

The **title** of the histogram describes the information contained inside it. The **X-axis** is a clustered interval that depicts the range of values in which the measurements are taken. The **Y-axis** is a scale that displays the number of times the values happened inside the intervals defined by the X-axis.

The **bars**: There are two dimensions to this parameter: height and width. The number of times the values happened inside the interval is shown by the height of the bar. The interval, distance, or area covered is indicated by the width of the bars.

Pareto charts

A Pareto chart, also known as a Pareto diagram, is a graph that uses the Pareto principle as its foundation. It's a kind of sorted histogram in Microsoft Excel that includes both vertical bars and a horizontal line. The relative frequency of values is represented by the bars, which are drawn in decreasing order, while the line shows the cumulated percentage.



Pareto graph emphasizes the main pieces in a data collection and displays their relative relevance to the whole.

Waterfall charts

A waterfall chart is a kind of graph that is often used to visualize financial information, compare profits, and analyze sales or product value over time. It's also used to visualize inventories and analyze profit and loss. They originally gained popularity in the late twentieth century, when McKinsey & Company used them in a client presentation.

Box & whisker charts

A box and whisker chart, also known as a box plot, is a statistical analysis tool in Excel that shows you how values are dispersed in a collection of data. For example, you may use a box and whisker chart to illustrate statistical information on test results across topics to determine which subjects need greater focus from pupils.

Treemap charts

A treemap chart is a style of data representation that excels at portraying hierarchical data. Each element is displayed as a rectangular shape on a treemap, with smaller rectangles representing sub-groups. The color and size of rectangles are usually associated with the tree structure, making the groups and sizes simpler to perceive. Treemap charts are excellent for emphasizing each object's contribution to the overall hierarchy.

Sunburst charts

A sunburst chart, like treemap charts, is a style of visualization that works well for visualizing hierarchical data. A sunburst chart is a circular diagram in which each circle symbolizes a group hierarchy level. The high-level groups are plotted in the inner circle, while the sub-categories are plotted in the outer rings. The segments' sizes are proportionate to the values they represent. A sunburst chart is divided into three sections: Plot Area, Chart Title, and Legend.

Plot Area: The plot area is where the graphic expression occurs. Like pie and donut charts, a sunburst chart illustrates parts of the full data set. A top-level group is represented by each hue. **Chart Title:** Make an effort to be detailed and succinct. The **legend** is an indication that aids in the differentiation of data sets. Each color denotes a category at the top level.

Funnel charts

Funnel charts are comparable to their name in that they are used to display data behavior at each step specified, and when the numbers decrease, the chart takes on the form of a funnel, thus the term funnel chart.

Map charts

These are used to depict a certain Key Performance Indicator (KPI) and demonstrate its representation over different geographical locations for a given category, such as a business, sector, or commodity.

CHAPTER TEN

USING ADVANCED CHARTING TECHNIQUES

SELECTING CHART ELEMENTS

When you are done creating a chart, you can add some chart elements to your chart. You can select the chart elements in different ways.

Selecting with the mouse

Simply click on the chart element. Also, click directly on a bar in your chart to choose the data series. Double-click on an element for it to display.

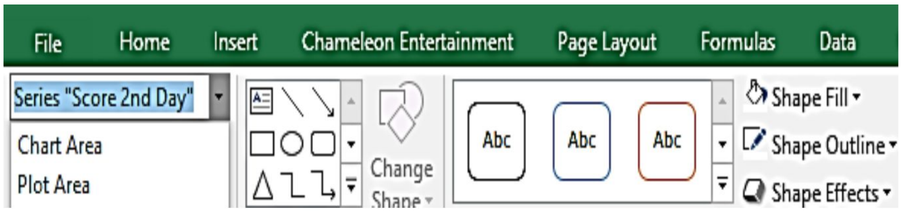
Selecting with the Keyboard

You can use the up and down keys to select chart elements in your worksheet. Simply, click on the chart, press down the Control key, then use the up and down keys to navigate through the main chart elements.

Some chart elements have sub-elements. To access those sub-elements, use the right and life arrow keys. Click the chart, use the up arrow key to pick the element, use the right/left arrow keys to pick the sub-elements.

Selecting with the chart element control

You can select chart elements from the chart element control on the Format tab. When you click on a chart, the list of the main Chart Elements will be displayed on the menu.

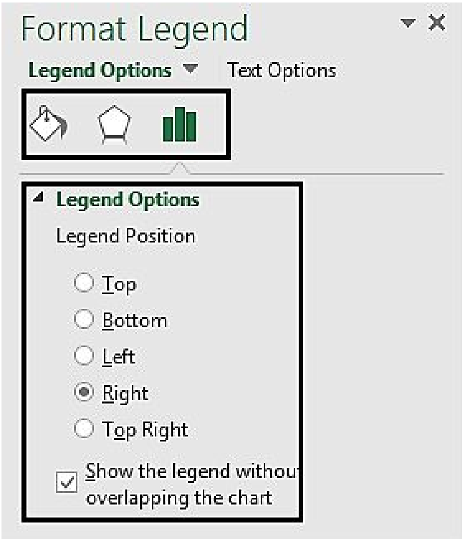


With this menu, you can go to the chart title, plot area, and so on. When you click on an element, the name will show there.

EXPLORING THE USER INTERFACE CHOICES FOR MODIFYING CHART ELEMENTS

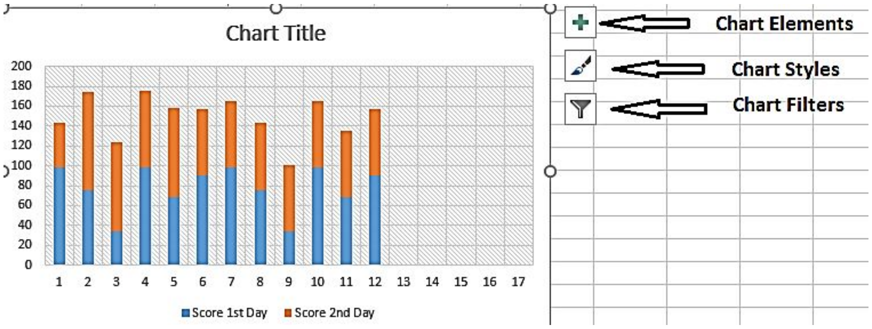
Using the format task pane

Pick the chart element that you want to modify, then right-click on it and select Format (the name of the chart element comes after format). This will open up the Format pane. On it, you will see a list of options for the selected chart element.



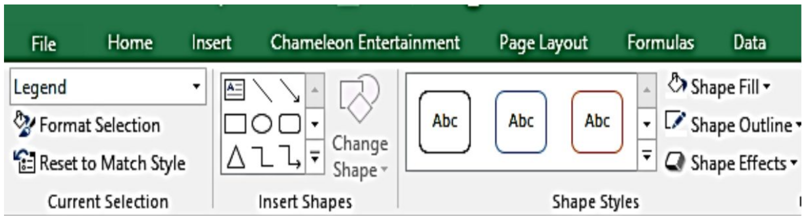
Using the chart customization buttons

Click the chart you have created on your worksheet, then select a customization button on the right side.



Using the ribbon

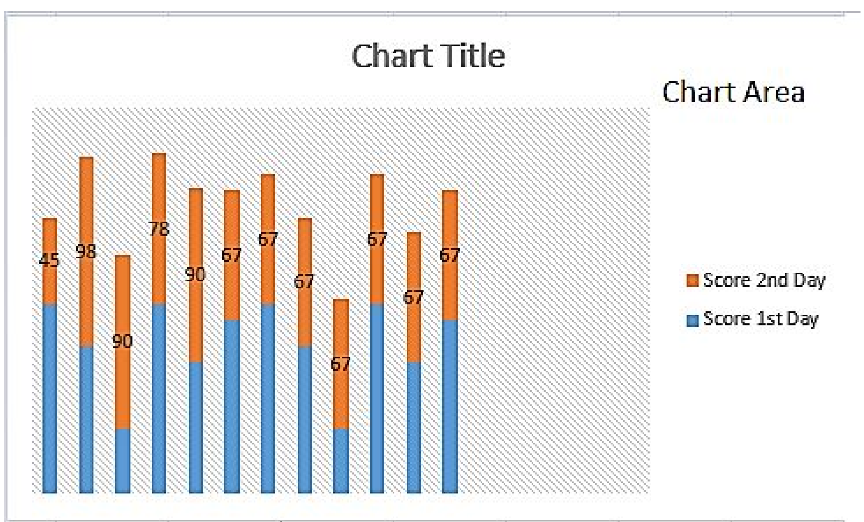
First, pick the chart element, navigate to the Format tab which is located below the Chart Tools. You will see options for modifying your chart elements.



Using the Mini toolbar

Right-click on the chart element to see the mini toolbar. On it, you will see some chart modifying options like fill color, style, and outline. Click on any of the options to modify your chart.

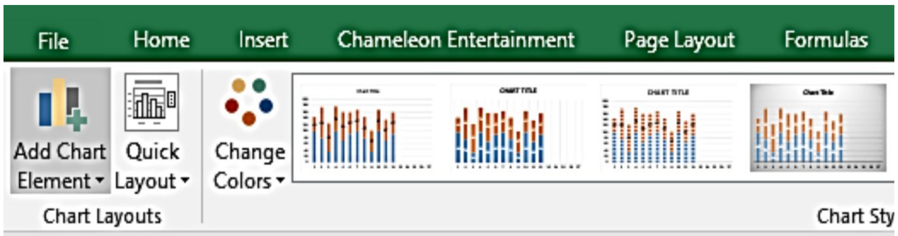
Modifying the chart area



The chart area is the part of a chart that encompasses all elements of a particular chart. You may change the appearance and position of your chart. A few options are shown here, but there are many more! To access **Chart**

Tools in any situation, you must first pick the chart. When you click on the chart, you can use the Design tab and the Format tab to modify it.

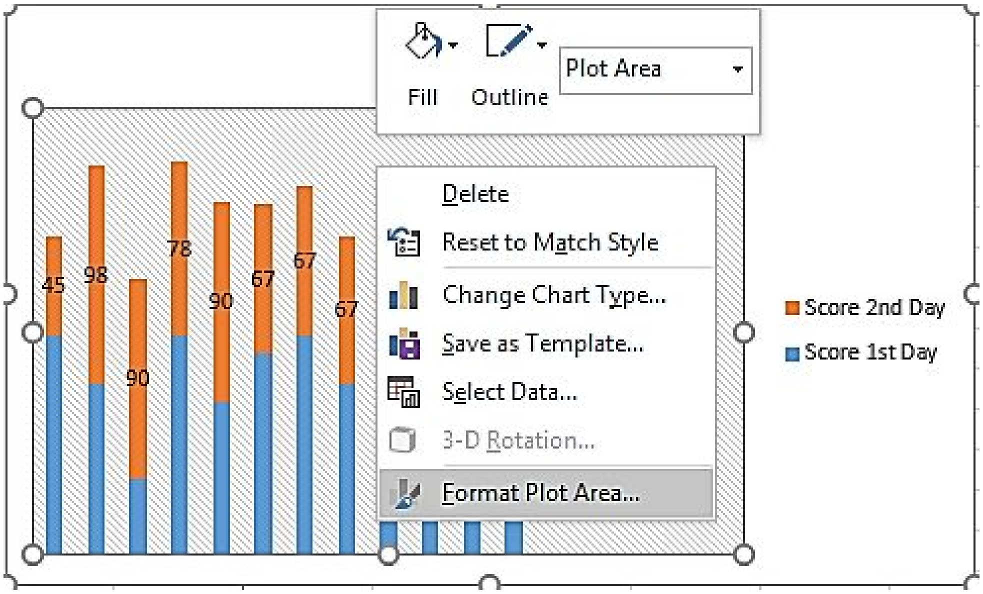
To add labels such as title, axes, etc. Select the **Add Chart Element option** and select a label. The **Chart Tool tab** contains many modifying options. You can change colors, chart styles, move charts, add borders, add shapes, etc.



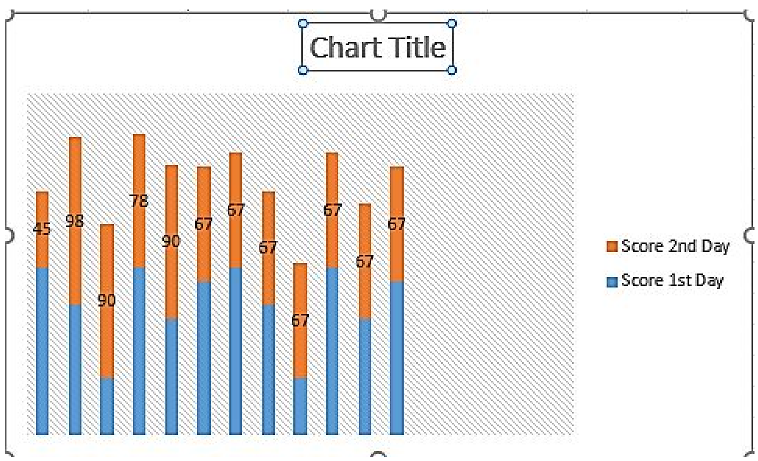
Modifying the Plot area

The plot area of a chart is found inside of a chart. It consists of the actual chart. Just like the chart area, you can change the border and fill the plot area. When you add elements to a chart, it changes the plot area size.

When you right-click on the plot area, you will see some options for modifying the plot area.

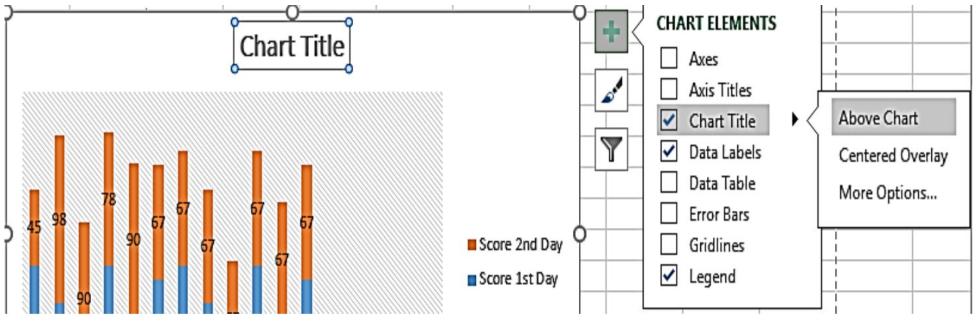


Working with Titles in a chart



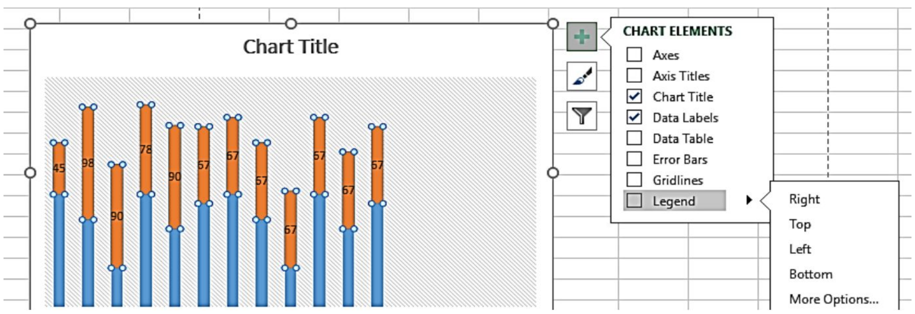
The chart title is located at the top. When creating a chart with just a column, the column heading becomes the title of the chart. When you create a chart with a group of columns or rows, the title is **Chart Title**. Click on it to edit the name.

You can add or delete the chart title if you want to. Simply click on the chart, select the chart element icon, then uncheck the Chart title box. You can also change the position of the chart title.

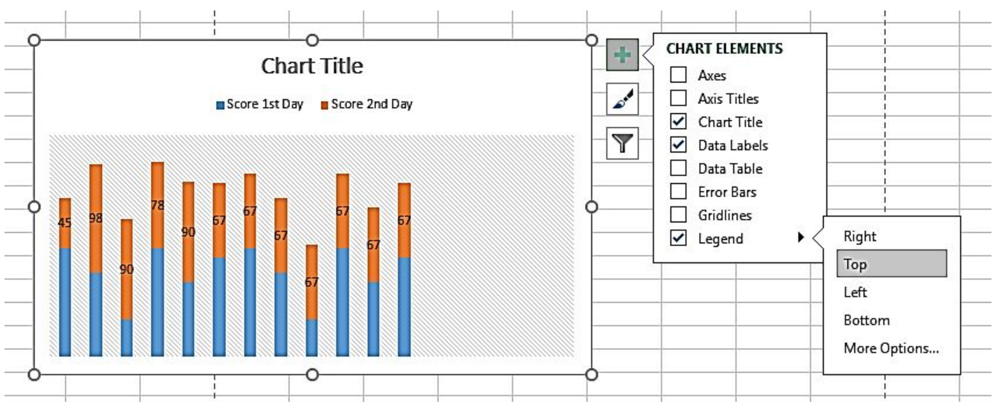


Working with Legends

As said in the previous chapter, the legend is displayed by default at the right side of the chart when you create a chart. If you want to hide it, click on the **Chart Elements** icon, then uncheck the box beside the Legends option.



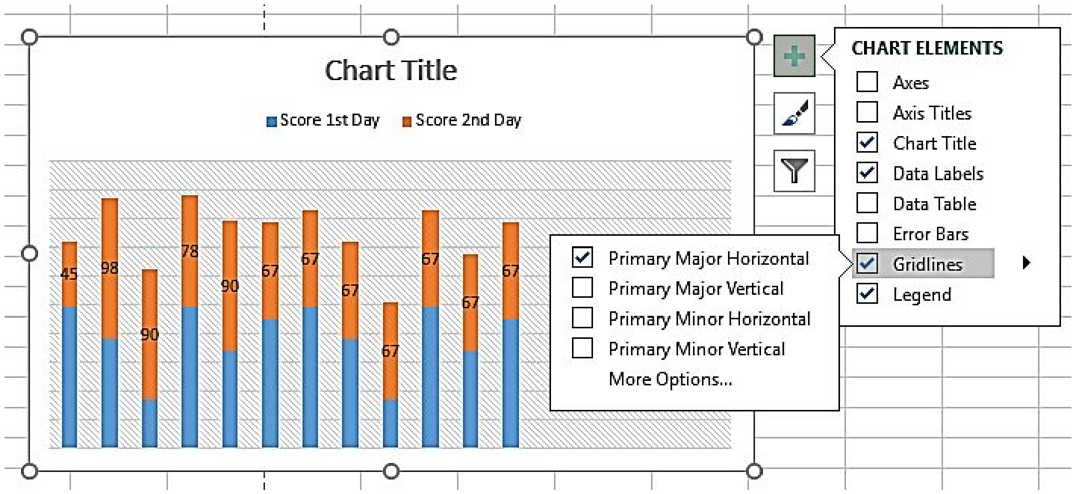
To change the position of the legend, simply click on the chart element icon, then, click on the arrow next to **Legend**, then select where you want to move it to.



Working with Gridlines

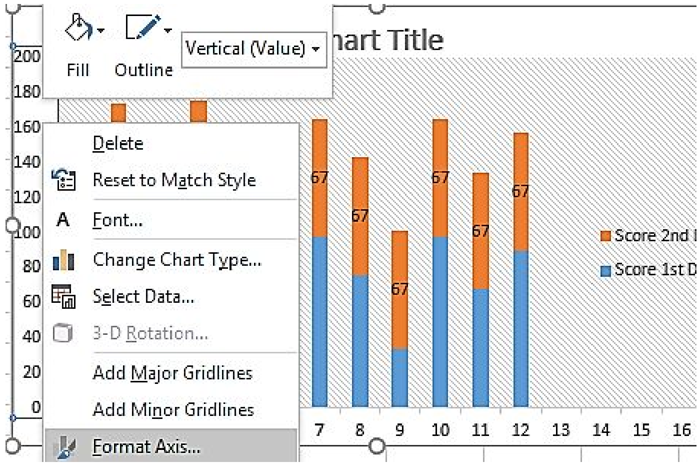
Click the Chart Element icon on the chart and check the box beside Gridlines. You can select the type of gridlines you want to use on your chart.

Click on the arrow next to Gridlines and select an option from the box.

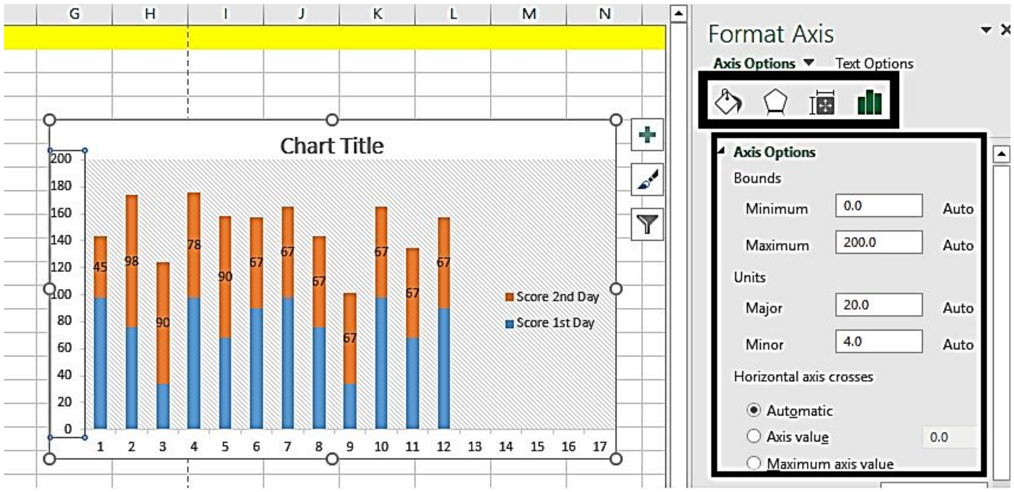


Modifying the Axes

You may have added an axis on your chart but the scale of the axis is small or too big to display the units in the chart. You can modify it to your choice. Simply right-click on the axis you want to modify and select Format Axis.



This will open up the Format Axis pane. On the pane, select any icon to modify the axis. Each of the icons has its modifying options.



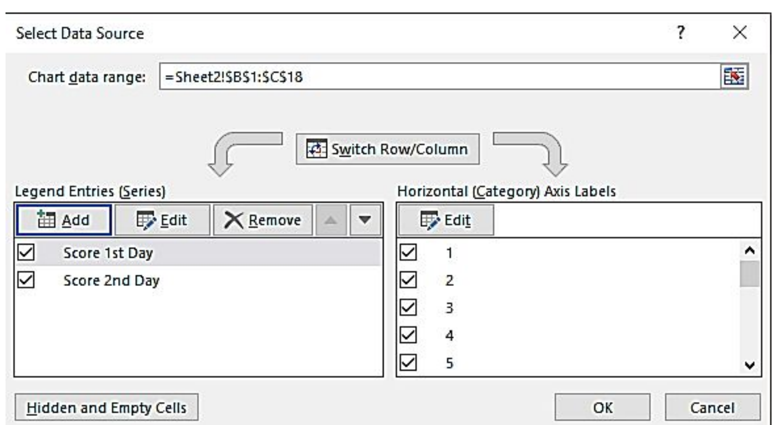
WORKING WITH DATA SERIES

Deleting or hiding a data series

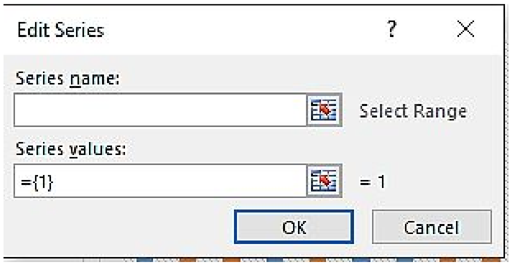
You might want to delete some data on your worksheet. Simply click on the Chart Filter icon, then uncheck the box beside the data series you want not to display.

Adding a new data series to a chart

Right-click on the chart, then click on **Select Data**. The Select Data Source box will open. On the left side is where the data series are listed, such as Add, Edit, and Remove buttons. So you can add, remove and edit data series with these buttons.

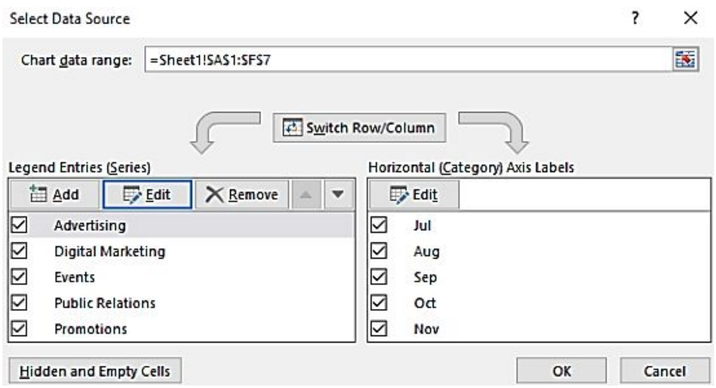


Click on the **Add button**. The Edit Series box opens, then enter the name of the series and its value. Then, click Ok.



Changing data used by a series

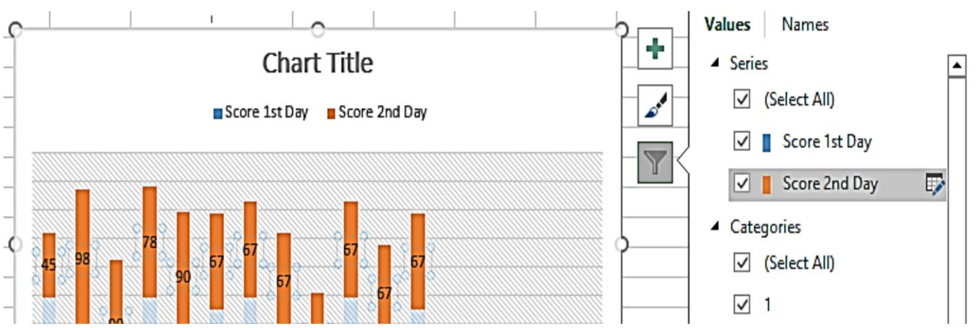
To change the data in a series, go to the **Select Data Source menu** using the steps above. In the data series box, select the series that you wish you change, then click on the Edit button. Then, apply your changes.



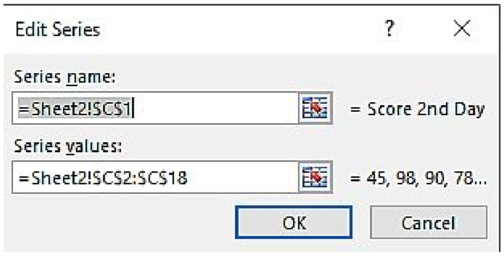
Note that these changes are likely to break connections to the source data in your spreadsheet.

Using the Edit series dialog box

If you want to edit a data series, select the Chart Filter icon. This opens a box containing data series. Click on the Edit series icon at the right side of the data series you want to edit. You will see the icon when you hover your cursor on the data series.

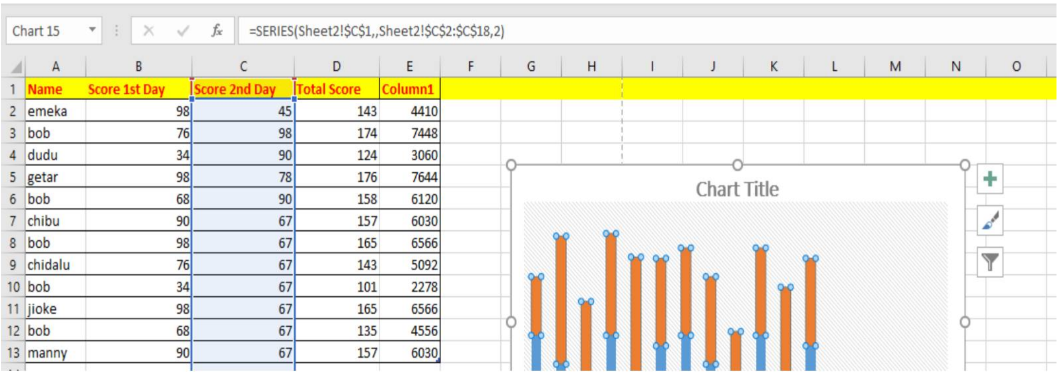


When you click on it, it opens the **Edit series** dialog box. You can now edit the series name and value from the box.



Editing the Series formula

The data in your chart is connected with the series formula. This formula is only available for a chart. When you click on a series in your chart, you will see the series formula on the formula bar. The formula is generated by default. It is written by Excel after creating a chart or adding a series.



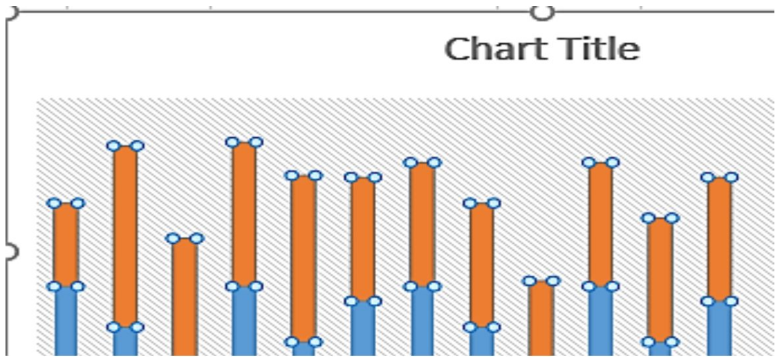
The formula for the data series I just selected is written in the formula bar as **=SERIES(Sheet2!$C$1, Sheet2!$C$2:$C$18,2).**

So, you can add a new formula. You can change the "**C**" in the series formula and add another alphabet like "G". The chart will apply the series name and Y values in Column G.

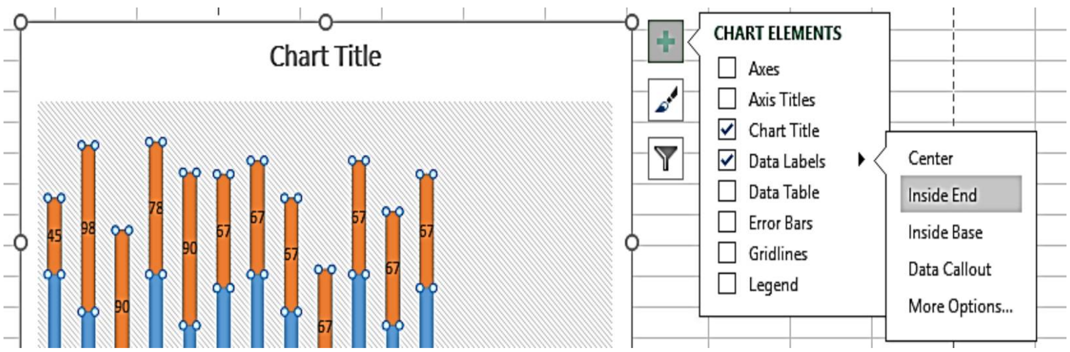
Displaying data labels in a chart

You may add data labels to your Excel graph to highlight information about the data series, making it simpler to interpret. You may add labels to one data series, all data series, or individual data points, based on where you'd like to concentrate your users' attention.

Simply select the data series. If you want to add a label to just a data point, select the data point after choosing the series.

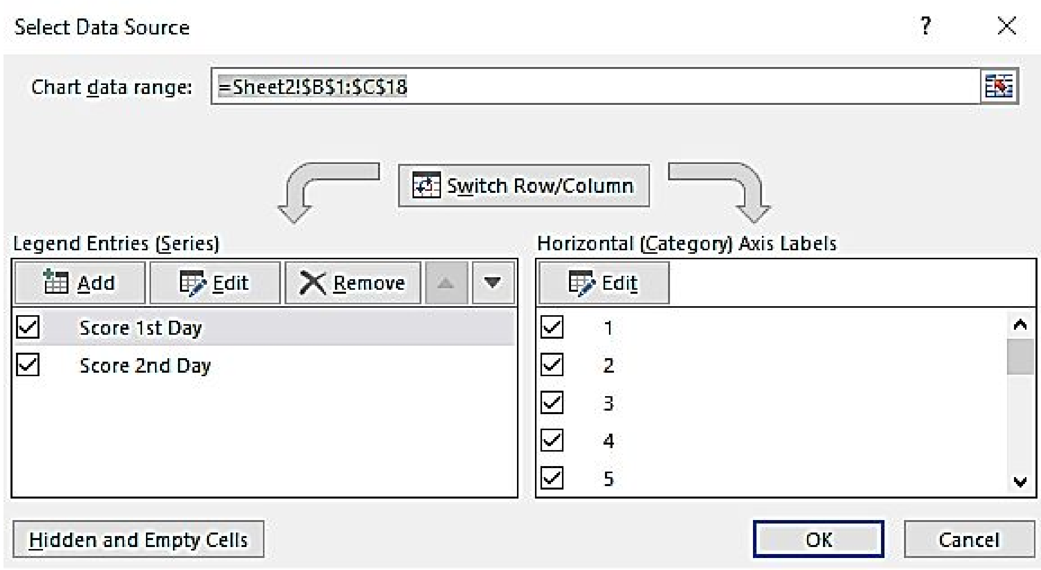


Then, click on the Chart Elements icon, then, check the box beside Data Labels. You can click on the arrow to decide the location where you want to place the data series.

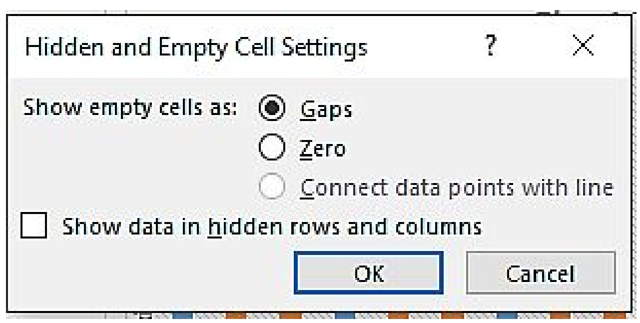


Handling missing data

The data you're graphing may be missing a data point or more. Excel has some solutions for dealing with missing data, including the ability to chart concealed data in a range. Right-click on the chart and choose **Select Data**. Click on Hidden and Empty Cells.



The Hidden and Empty cells box will open. Then, decide how to handle the missing data.



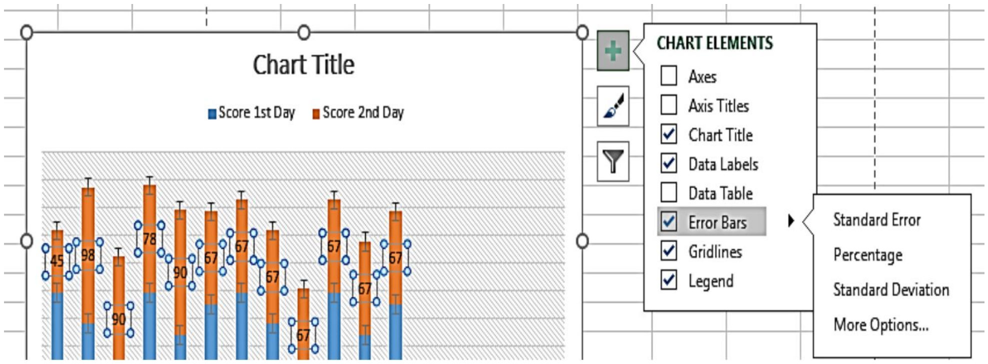
Gaps: This is the default option of Excel. The missing data is not included in Excel. A gap is given by the data series for every missing data point.

Zero: The missing data is seen as zero.

Connect Data missing data as zero: The missing data is calculated with the data on either side of the missing point(s). This only works for some of the X Y scatter subtypes and line charts.

Adding error bars

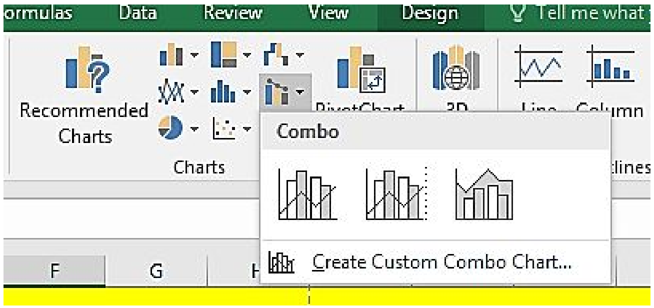
To add error bars on your chart, simply click on the chart, then select the Chart Element and check the Error bars box. You can click on the arrow to select the kind of error bar you want to add.



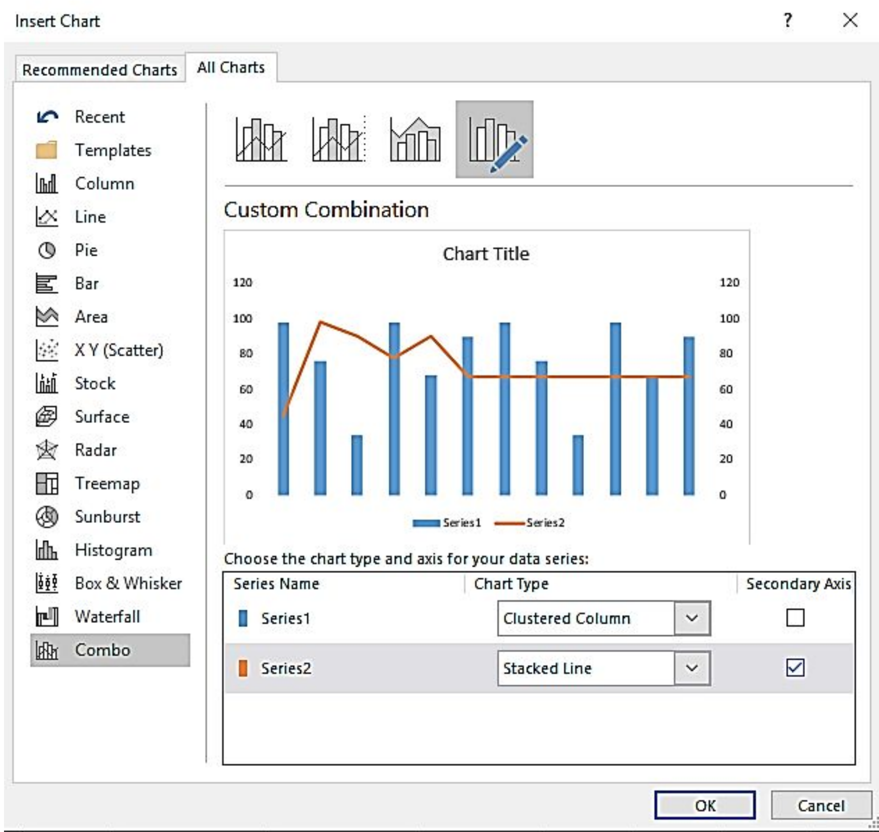
Creating combination charts

A chart that consists of two or more chart types in a chart. Follow the steps below to do so;

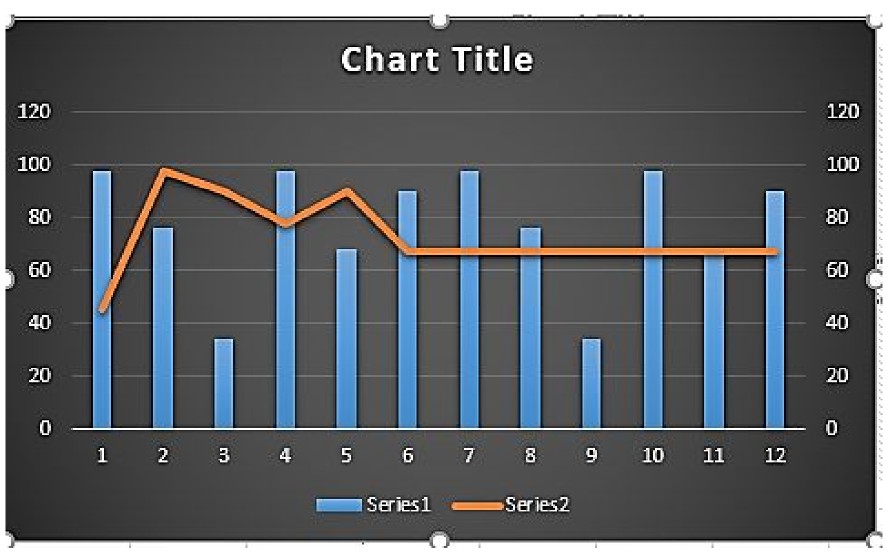
Simply select the cells/range. Click the Insert tab and select the Combo symbol.



Select Create Custom Combo Chart. This opens the Insert Chart menu. Below the menu, select the chart type for the series name you have selected. You can select two different types of chart types. You can check the box on the secondary axis options. Then click Ok.



You will get the chart on your worksheet.



Displaying a data table

Select the chart you would like to display its data table. Click on the **Chart Element** icon, then check the **Data Table** box. Click on the arrow beside it to choose if you want to display it with legend keys or not.

Creating Chart Templates.

After creating a chart, right-click on it and select Save as Template. The Save Chart Template dialog will open. Type in the name of the template then selects Save. Chart Templates are saved in the Charts folder. They are included in the Templates folder in the Insert Chart and Change Chart Type dialog.

CHAPTER ELEVEN

CREATING SPARKLINE GRAPHICS

What is a Sparkline

Sparklines are small charts that stay inside a cell. They serve as the background of that cell. Sparklines make your look better. They display trends over time.

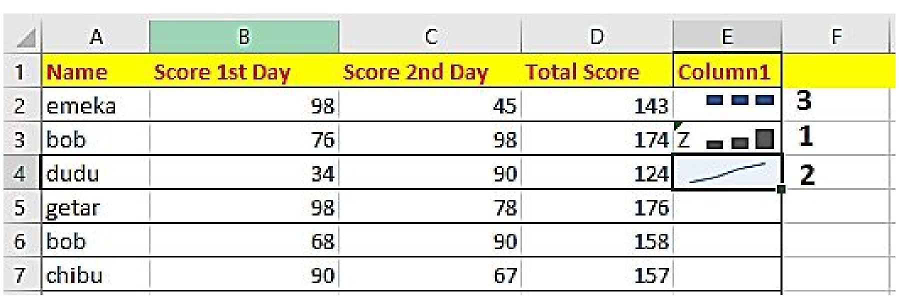
Sparklines are changeable and reliant on the dataset they're based on. The sparkline would update automatically as the underlying dataset changed. As a result, it's a great tool for producing Excel dashboards.

The size of the sparklines is determined by the cell size. The sparkline will alter in response to changes in cell height or breadth. You may type in a text when sparkline is active in a cell.

Sparkline Types

The types of sparklines are **Line**, **Column**, and **Win-Loss**.

1. **Column Sparkline**: This sparkline comes in form of a column chart or bar chart.
2. **Line Sparkline**: This comes in form of lines.
3. **Win or Loss Sparkline**: To display negative values. For example, it displays the ups and downs of the floated costs.



	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score	Column1	
2	emeka	98	45	143		3
3	bob	76	98	174	Z	1
4	dudu	34	90	124		2
5	getar	98	78	176		
6	bob	68	90	158		
7	chibu	90	67	157		

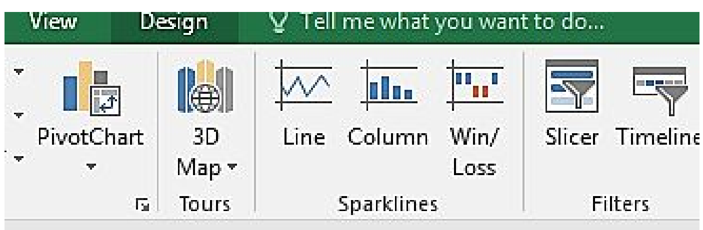
A win-loss sparkline is more like a column sparkline, except that it does not display the degree of the value. It's best for scenarios with binary outcomes, such as Yes/No, True/False, Head/Tail, 1/-1, and so on. For instance, if you're trying to figure out if there was rainfall in the last seven days or not, you may use a win-loss chart with 1 for rainy days and -1 for dry days. Everything discussed throughout this chapter for column sparklines could equally apply to win-loss sparklines.

Importance of Using Sparklines

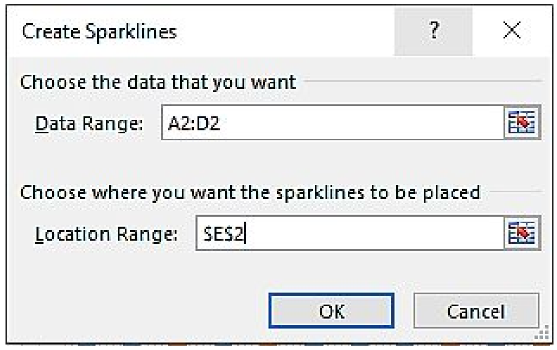
- When the cell width is altered, Sparkline automatically switches its size.
- Evaluate data patterns over a certain period
- For a limited period, data reports are being generated.
- Data compression is the process of converting data into a smaller format
- The data variations are simple to comprehend.
- Data representation, such as temperature and stock market price
- A better comprehension of data points with high and low values.
- Sparkline may efficiently float negative numbers.

Creating Sparklines

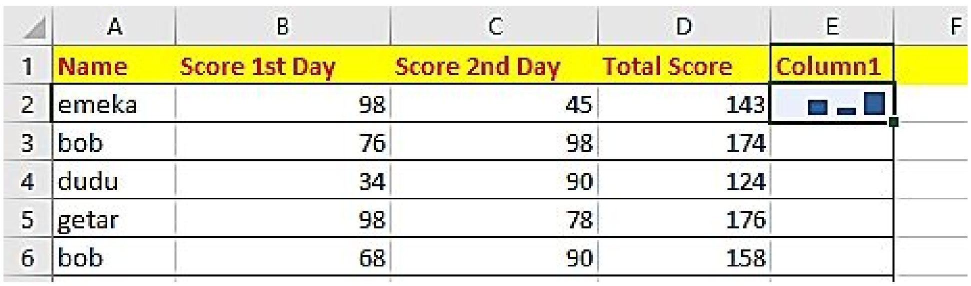
Choose the cell for the sparkline. Then, click **Insert** on the tab. On the right, is the Sparkline group. Click anyone.



The Create Sparkline dialog box shows. Choose the data range for sparkline. Here, my data range is A2:D2. Also, put in the location for the sparkline. You can do so by clicking on the cell.



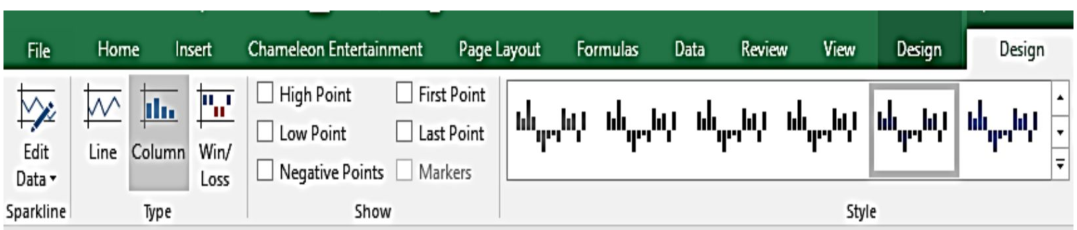
Then, click **Ok**.



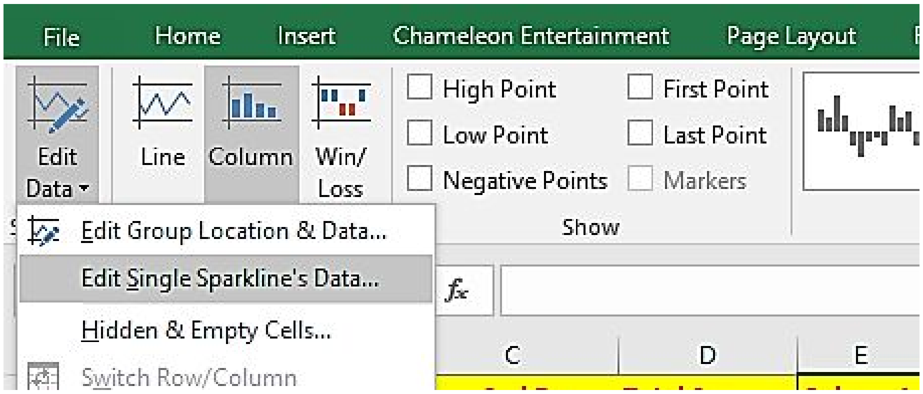
	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score	Column1	
2	emeka	98	45	143		
3	bob	76	98	174		
4	dudu	34	90	124		
5	getar	98	78	176		
6	bob	68	90	158		

Customizing Sparklines

You can make some customization to the sparkline you have just created. Simply click on the cell which contains a sparkline. The sparkline tool design will display on the tab.



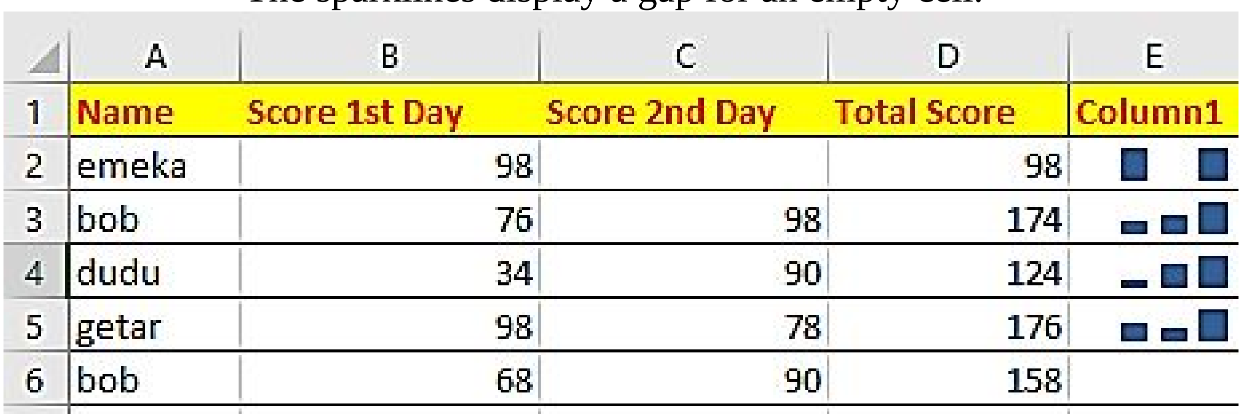
On the tab options, you will see a lot of customization options for the sparkline. You can change the color, change the style, add axis, show negative, positive, low points. If you want to edit the data of the sparkline, click on the **Edit data** option. You will see two options; **Edit Group Location & Data and Edit Single Sparkline only.**



Use the Edit Group Location & Data option to edit grouped sparklines. Use the other option to edit single sparkline data.

Handling hidden or missing data

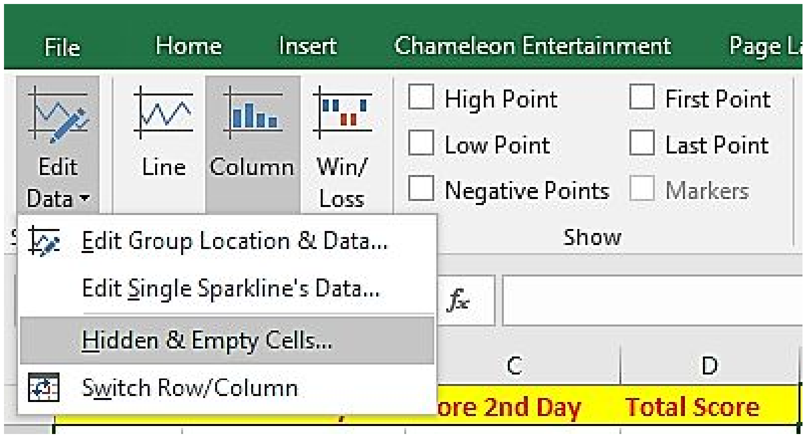
The sparklines display a gap for an empty cell.



	A	B	C	D	E
1	Name	Score 1st Day	Score 2nd Day	Total Score	Column1
2	emeka	98		98	
3	bob	76	98	174	
4	dudu	34	90	124	
5	getar	98	78	176	
6	bob	68	90	158	

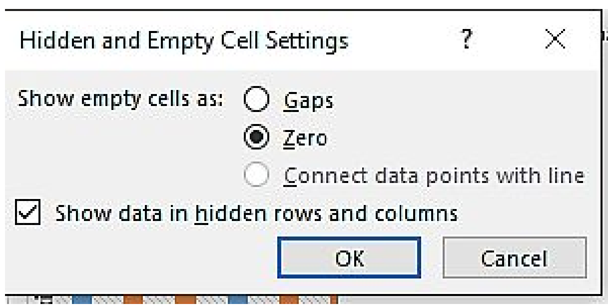
In the image above, the value of Emeka's score on the second day is missing and this created a gap in the sparkline. Look at the other sparklines and see how there is no gap on them. You can decide how you want to handle these empty cells.

Simply, select the cell which contains the sparkline. Click on the Design tab, click on Edit data and then, click **Hidden & Empty Cells**.



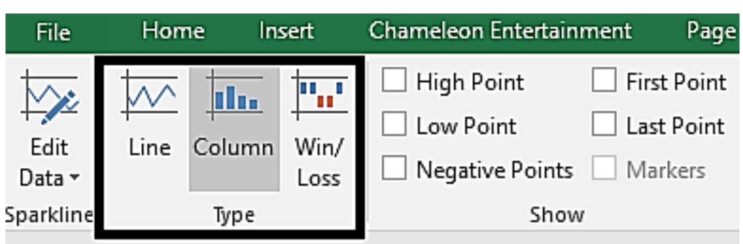
This opens up a dialog box. Choose how the empty cells will show either as **Zero**, **Gaps**, or **Connect the before and after data points with a line (as said earlier, this is only for line sparklines)**.

Check the box on Show data in hidden rows and columns to show the data.



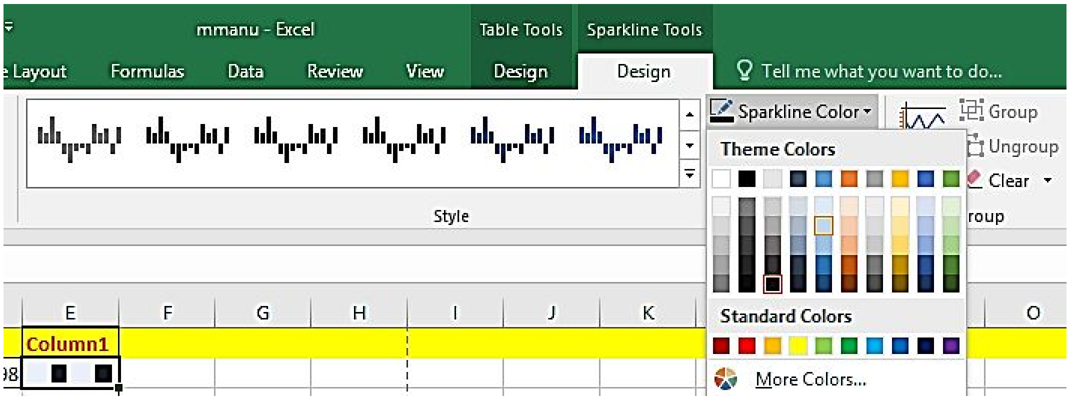
Changing Sparkline types

Click the sparkline, then, on the **Types** group and click on any sparkline type.

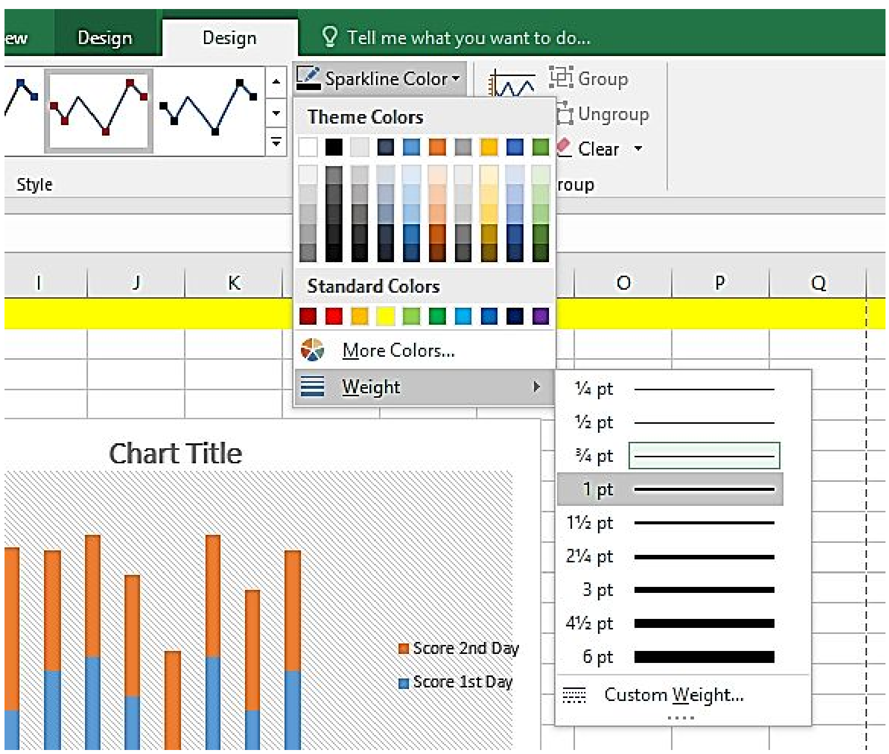


Changing Sparkline colors and line width

Click the sparkline. On the **Sparkline Tools Design tab**, on the Style group, choose Sparkline color. Then, select a color



To change the width, click on Weight, below the Sparkline color option drop-down menu. Then, select the line width you want from the displayed options. This will apply changes to the thickness of the sparkline. This is just for line sparkline.



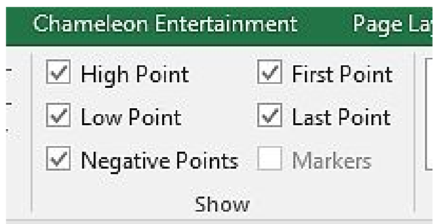
Merging and Sizing Sparklines cells

The sparkline adjusts to the new cell size when you adjust the width or height of a cell that has a sparkline. To merge cells, highlight the cells, choose **Merge & Center**.

If you combine cells that span more than a row or column, Excel will not allow you to insert a collection of sparklines into certain merged cells. Rather, place the sparklines into a regular range (one that does not include any merged cells), then merge the cells.

Highlighting certain data points

You can highlight some data points in your sparkline to make it more understandable and meaningful. You can decide to highlight the last data points, maximum points, negative data points, etc. Simply click on the cell that has the sparkline, then on the Design Tools tab on the Show group, which are different highlighting options.

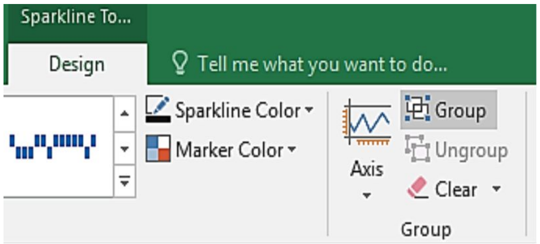


- **High Point;** for the maximum data point.
- **Low point;** for the minimum data point.
- **First point**; for the first data point.
- **Last point;** for the last data point.
- **Negative point;** for negative points if you have any.
- **Marker;** just for line sparklines. When you tick the box, it highlights the data points using a marker.

Grouping and Ungrouping Sparklines

You may have many sparklines. You can decide to group them. When you group them, it makes it easier to make changes to them once rather than doing it each.

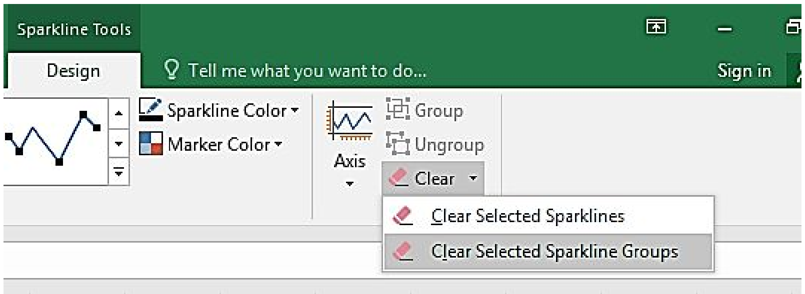
To group them, first select the sparklines, then click on **Group** on the Sparklines Tools Design tab.



To ungroup them, select the cells, then click on the Ungroup option.

Deleting Sparklines

The Delete key doesn't delete a sparkline. Use the Clear option on the ribbon. Select the cell, then on the Sparkline Design tool tab, on the **Group**'s group, and click on **Clear**. You can decide to **Clear Selected Sparklines** or **Clear Selected Sparkline Groups**.

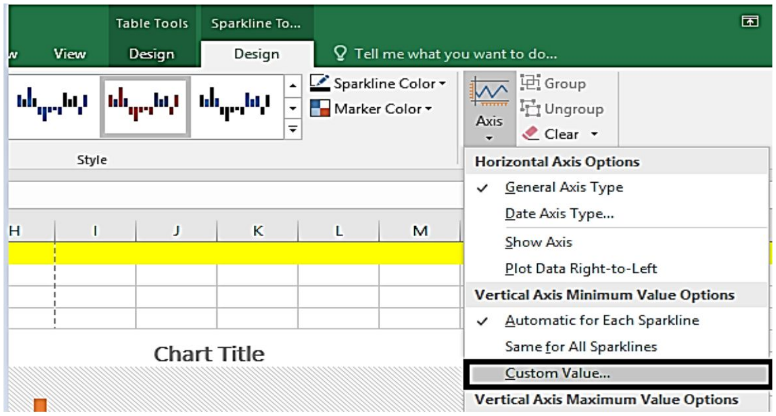


Adjusting Sparkline axis scaling

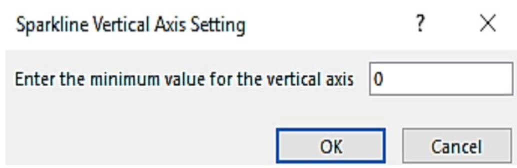
A sparkline displays the least data point at the bottom and all subsequent data points are linked to it.

You might not want it to be the case in certain circumstances since it seems to exhibit a lot of variances. To adjust this, follow the steps below;

Click on the cell containing the sparkline. On the Design tab, select the **Axis option**. From the drop-down menu, from the **Vertical Axis Minimum Value Options,** or the **Vertical Axis Maximum Value Options**, click on **Custom Value**.

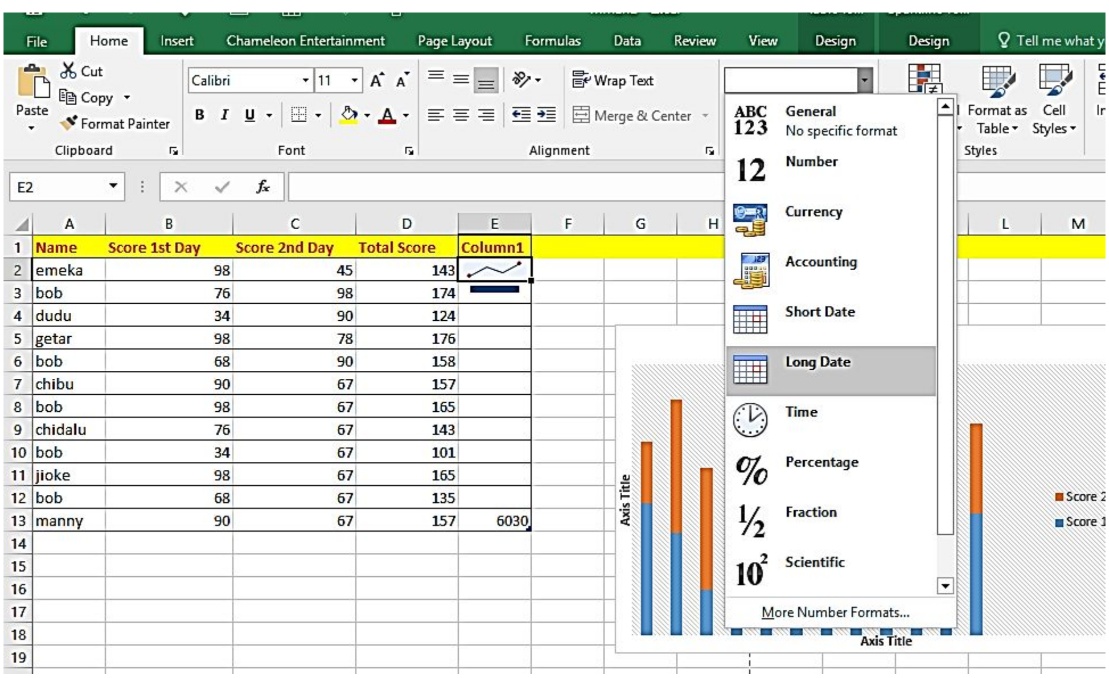


Type in the minimum value you want for the vertical axis, click Ok.

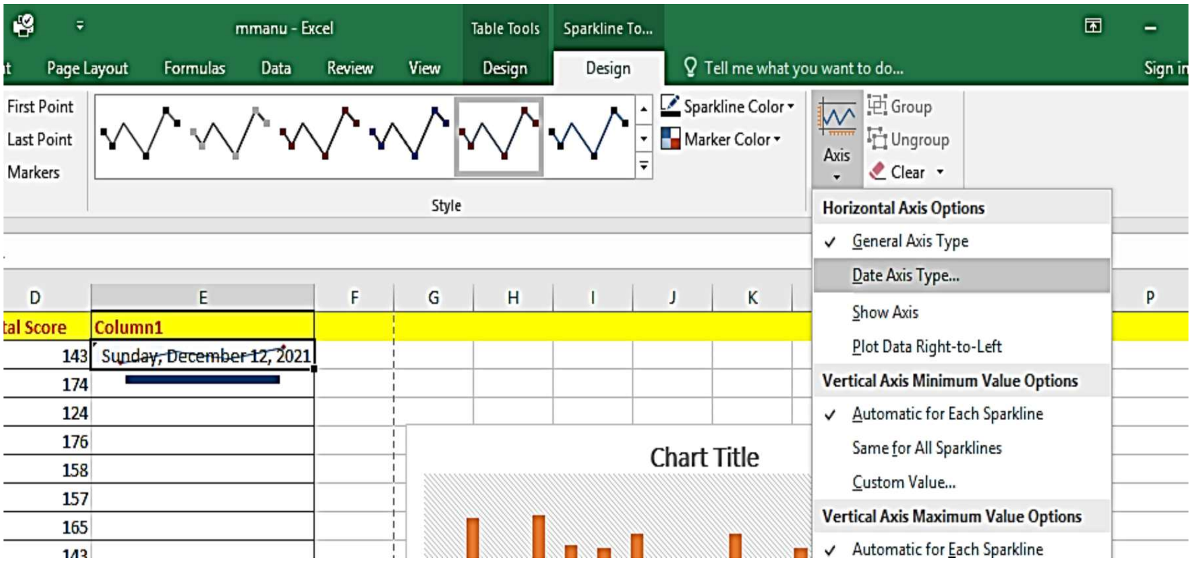


Specifying a date axis

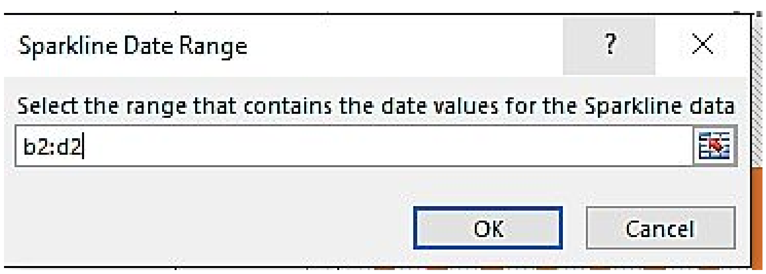
Click on the cell for putting the date values. On the Number section, click the down arrow.



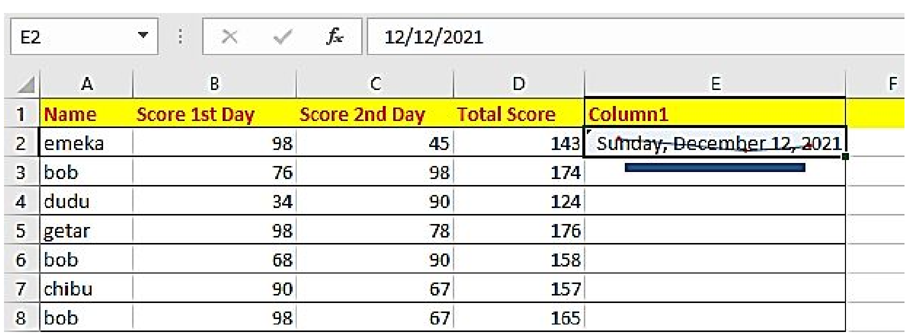
So, select **Long Date** or **Short Date**. Now, in the cells, put in the date values. Click on the cell, then on the Design tab, navigate to the Group's group and click on Axis. This will display a drop-down. Select **Date Axis Type.**



The Sparkline Date Range dialog will open. On it, choose the data cells. Then, click Ok.



You will notice that the graph on the cell changed. It has been re-plotted and has been sorted by date.



Auto-Updating Sparklines

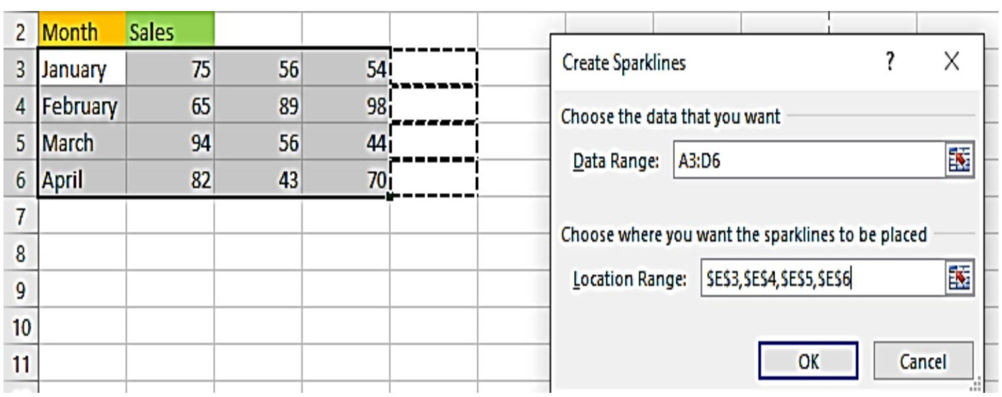
A common problem people have with Excel and sparklines is that sometimes people add more data to the worksheet and will forget to include the new data in the sparkline. By default, as you modify the data in the cells, the sparklines updates to the new data added.

Displaying a Sparkline for a Dynamic Range

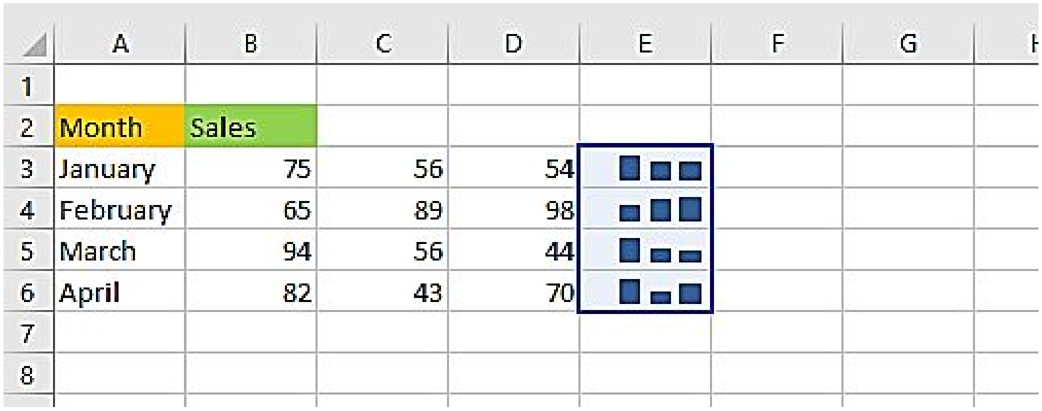
The term "dynamic range" refers to a range that is selected automatically when new data is supplied to an existing range.

When a new set of lines is added to the data, Dynamic Range in Excel enables us to always utilize the freshly updated range. When we add more cells or rows, it just updates itself. We've utilized a static range with fixed value cells, but with a dynamic range, our range will vary as the data is added. First, you have to format your data as a table. As you enter data in the cells, it is automatically updated in the chart or sparkline.

To display a sparkline for dynamic range, simply select the range of cells, then move to the Sparkline group on the Insert Tab. Select the sparkline you want to add. On the Create Sparkline box, put in the location range. To do this, select the cells you want the sparklines to display. You can hold down the **Control key** while you select them.



Then, click Ok.



	A	B	C	D	E
1					
2	Month	Sales			
3	January	75	56	54	
4	February	65	89	98	
5	March	94	56	44	
6	April	82	43	70	
7					
8					

SUMMARY

Sparkline is a short graph that doesn't have any axes or coordinates. Sparkline may be used to analyze a single column or row of data. For the Sparkline, there are a variety of formatting options. A micrograph that fits within a single cell is called a Sparkline. The delete key will not erase a Sparkline that has been formed. In a Sparkline, distinct data points may be highlighted.

CHAPTER TWELVE

VISUALIZING WITH CUSTOM NUMBER FORMATS AND SHAPES

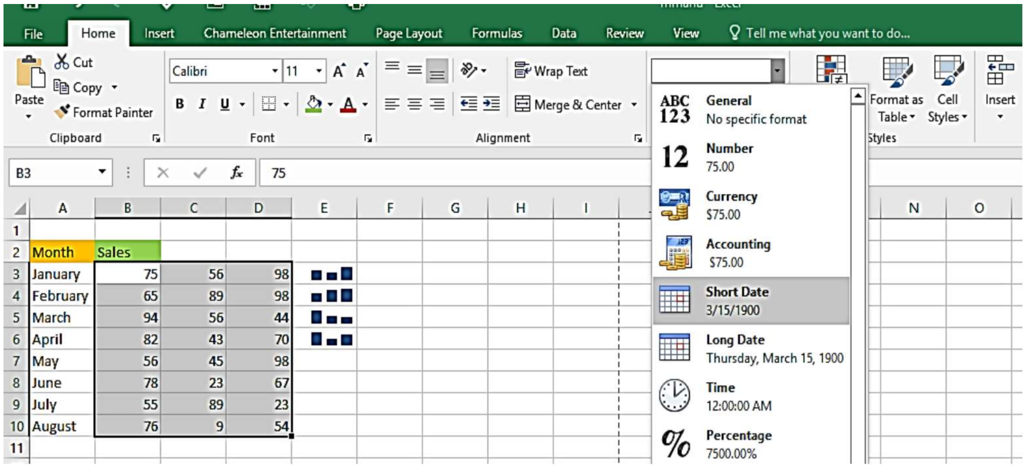
Visualizing with Number Formatting

Number, currencies, proportion, accounting, dates, and times are all designed formats in Microsoft Excel. However, there are times when you need something quite special. You may develop your number format if none of the built-in Excel formats satisfy your requirements.

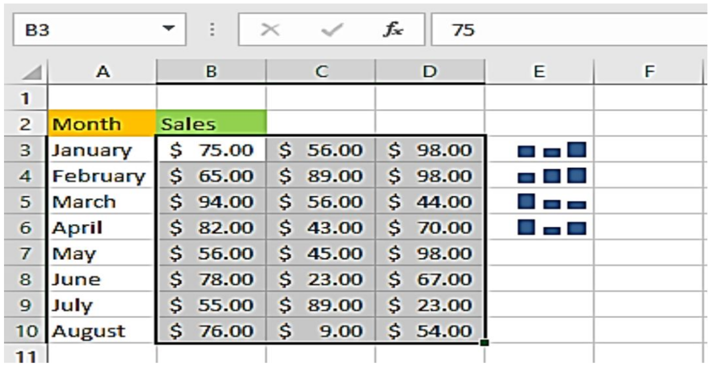
Number Formatting is a tremendously effective technique. The goal of this lesson is to walk you through the components of Microsoft Excel number formatting so you can understand custom number formatting.

Doing basic number formatting

So, highlight the cells containing the numbers for formatting. On the Number group, the default format for your number is General format. So, click the down arrow close to General and select the format you want.

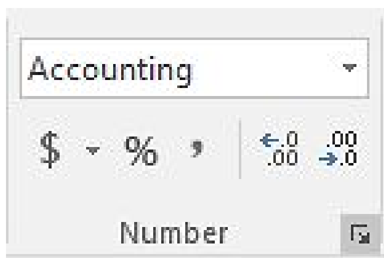


I formatted the numbers using the **Accounting** format option.

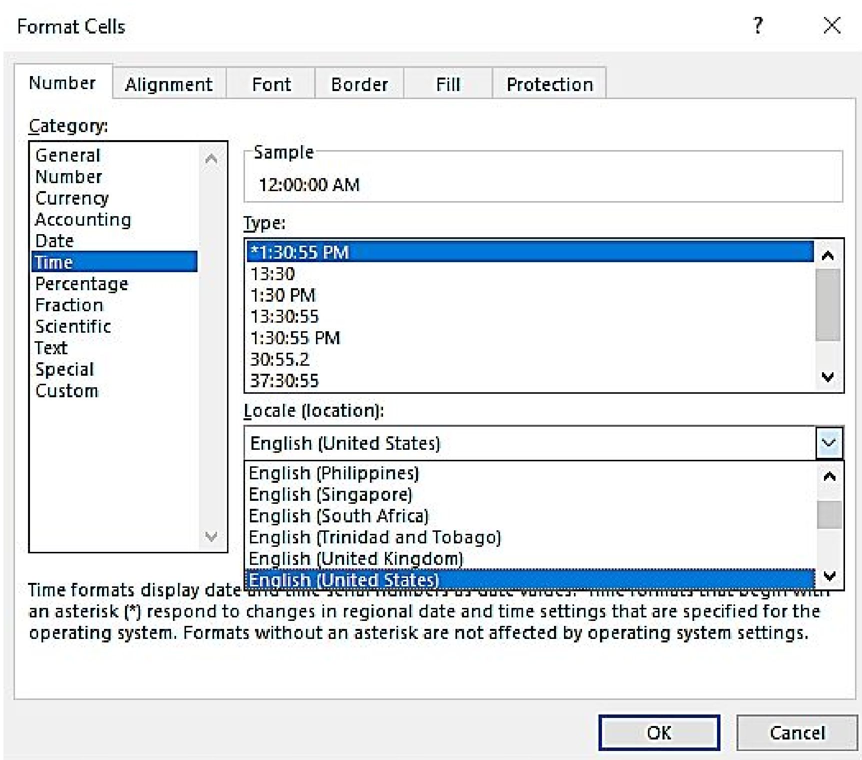


Using the formal cell dialog box to format numbers

You may not find the formatting option on the menu. So, to find them, simply highlight the cells containing the numbers, then on the Numbers group, click on the down arrow which is the dialog box opener.



This will open up the Format Cell dialog box. On the Number Tab, you will see lots of number formatting options. Click on the one you want to use, then click Ok.



Using shortcuts keys to format numbers

With shortcuts, you can easily format the numbers in your worksheet. Use **Control + Shift + Number key**. With it, you apply some formatting to your numbers.

Simply select the cell(s), then press the keys below;

Control + Shift + ` = **General**	Control + Shift + 5 = **Percentage**
Control + Shift + 1 = **Number**	Control + Shift + 6 = **Scientific**
Control + Shift + 2 = **Time**	Control + Shift + 7 = **Border**
Control + Shift + 3 = **Date**	

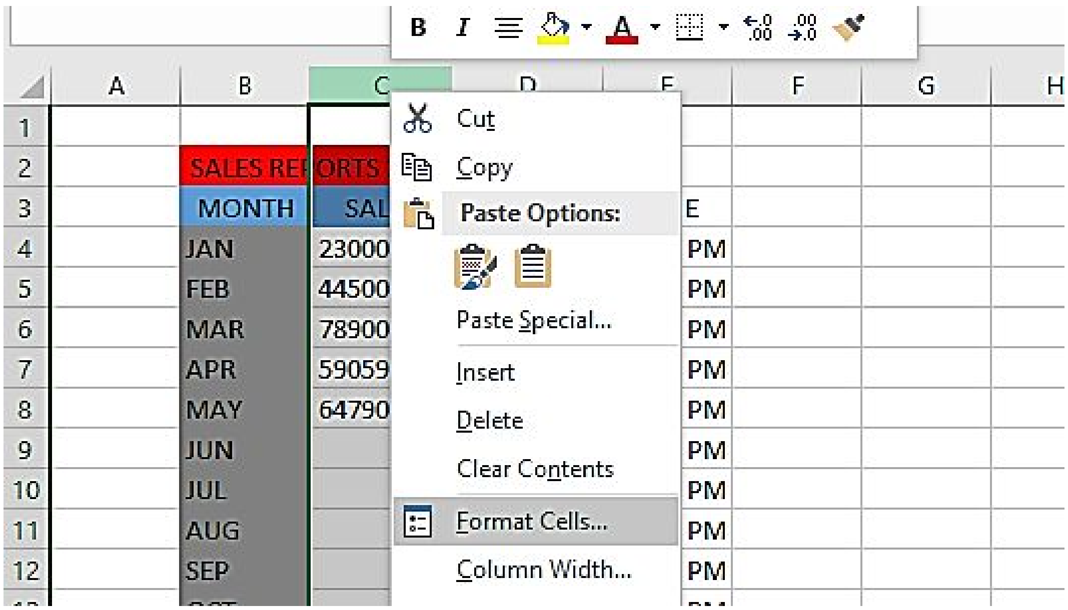
So, press and hold down the Control key and Shift key, then press any of the numbers on your keyboard.

GETTING FANCY WITH CUSTOM NUMBER FORMATTING

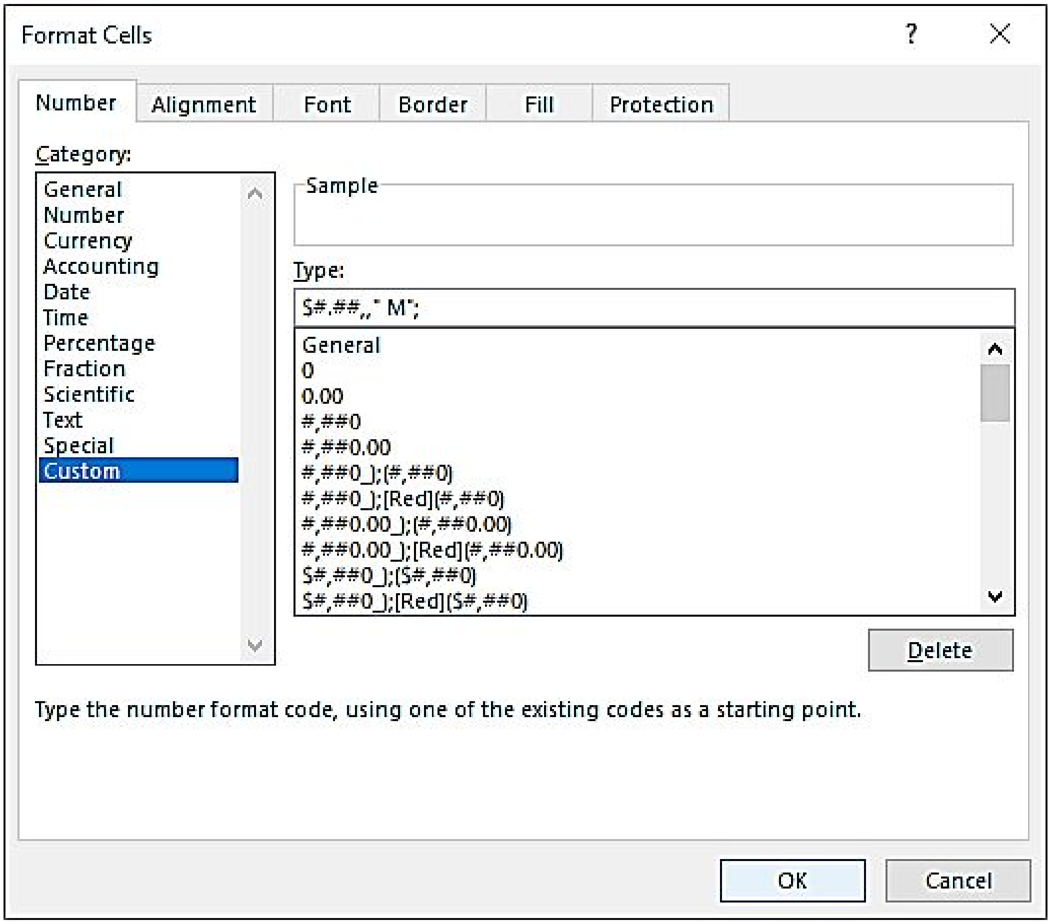
Formatting numbers in thousands and millions

In Excel, you may wish to format a number in a custom manner, such as formatting 421020000 as $421.02 M, and then store this for future use. You can also apply it to multiple cells. To do this, follow the steps below.

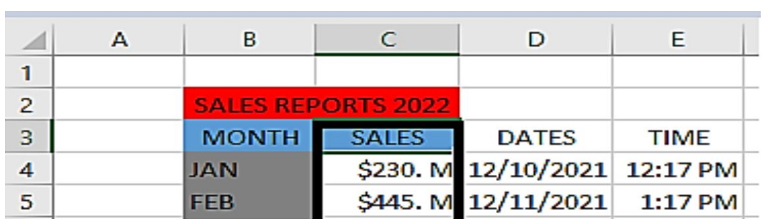
Select the cell that has a number value in it, right-click on it, then click on **Format Cells**.



Click on the **Number tab** on the Format cell box, then click on Custom. On the box below the Type option, type in the format code $#.##,," M";



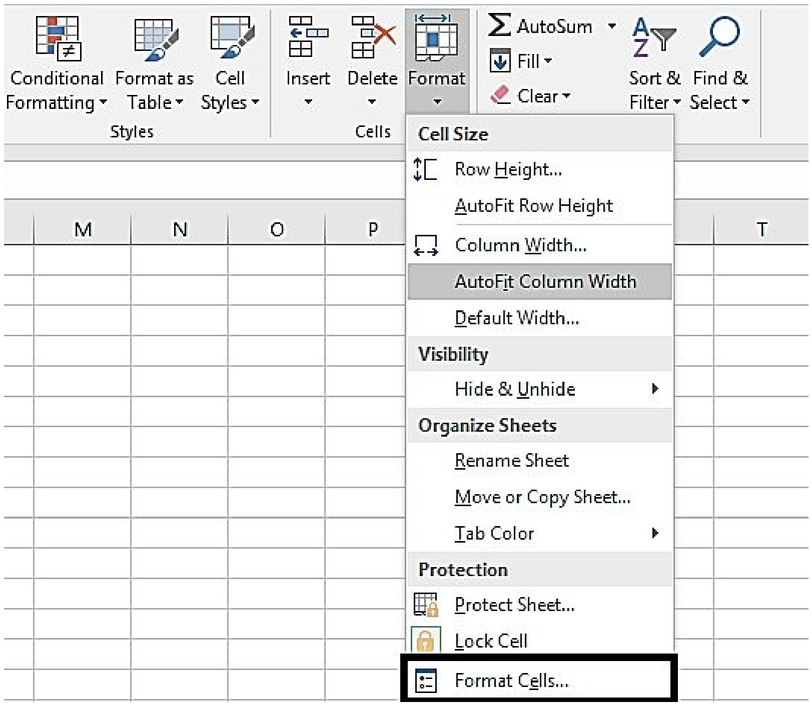
Then, click OK



Hiding and suppressing zeros

The number format can hide the zeros in the values of the cells. The hidden values are shown in the formula section. When any number in the cells changes to a nonnegative value, the value will be displayed in the cell with a format similar to that of a general format. Follow the steps to do hide zeros;

Click on the cells that have zero value in them. On the Home tab, select Format then select Format Cells.

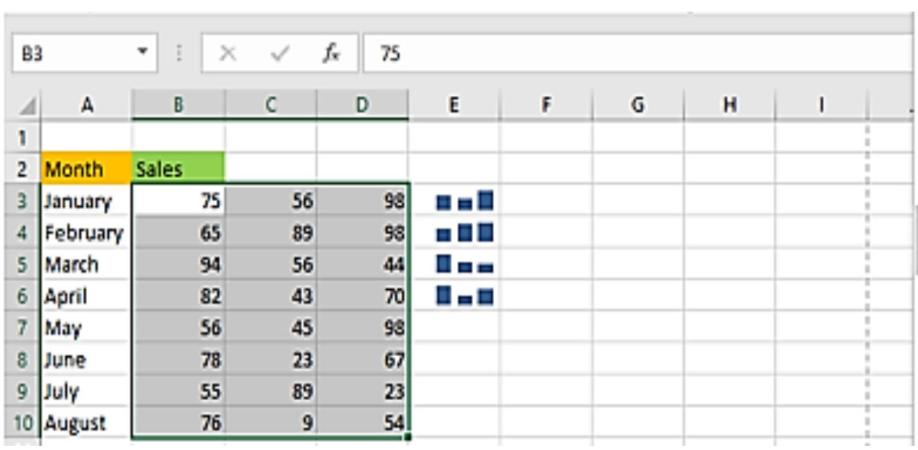


On the Format Cell box, on the Number Tab, click on Custom. On the Type box, put in this format code **0;-0; @**. Click Ok. The Zeros will be hidden.

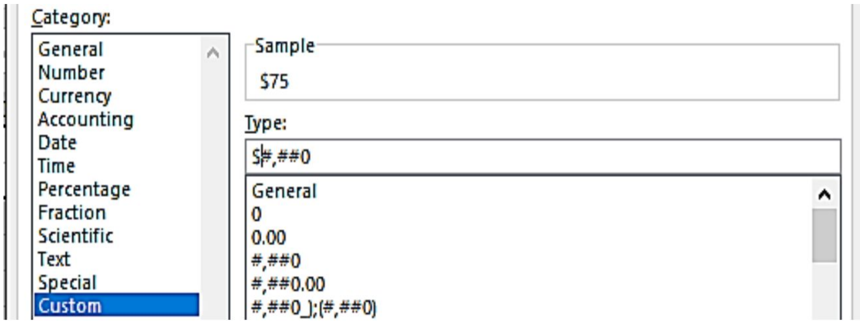
To display them again, select the cells, navigate to the Format cell box, then on the Number tab, click General, and click Ok.

Applying custom format colors

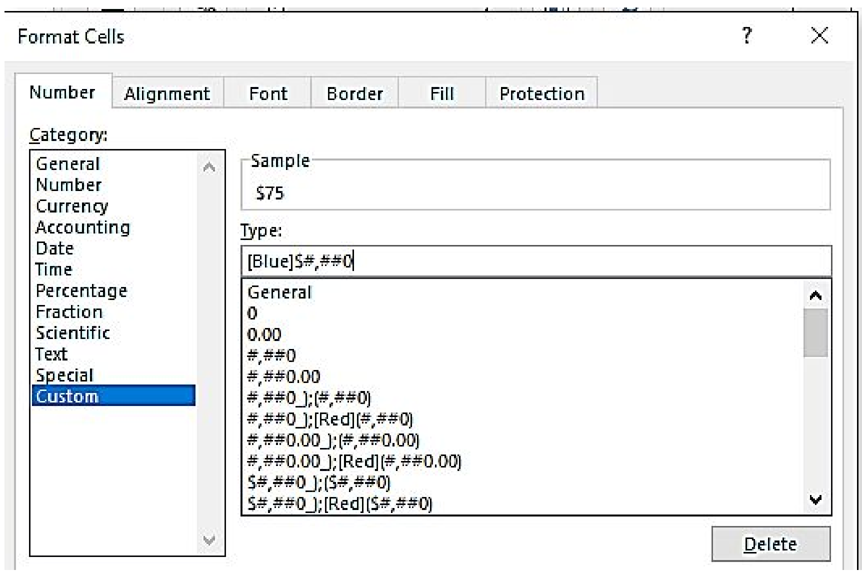
So to apply custom format colors, simply highlight the cells, then open up the Format dialog box with the steps we explained before.



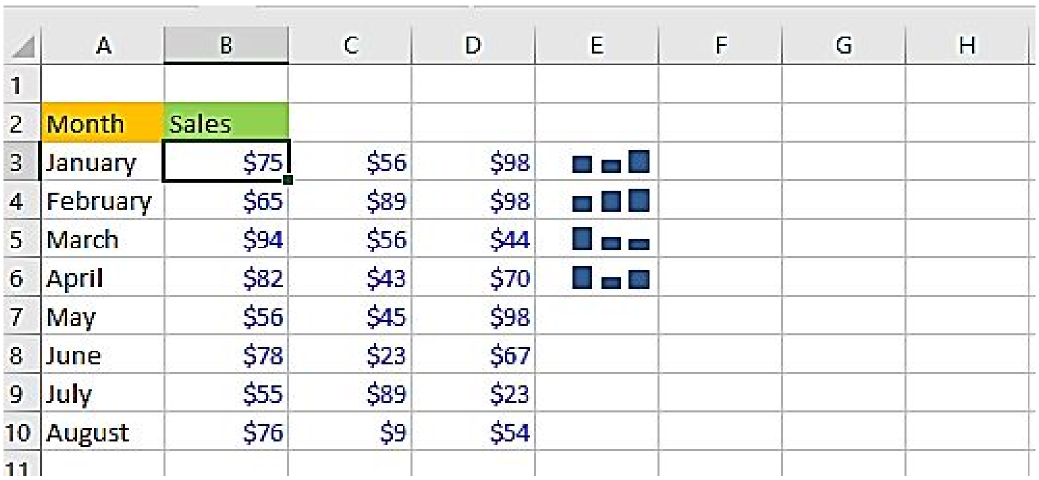
Then, on the Formal cell box, click **Custom**. On the Type box, click any format option there. In my case, I go with **"#,##0".** So, I want to create a custom currency format. So we add a dollar sign. You can see the preview of what you are doing in the **Sample** box.



So, to apply color to the custom format, type in the color name at the front of the format and it should be written inside a square bracket.



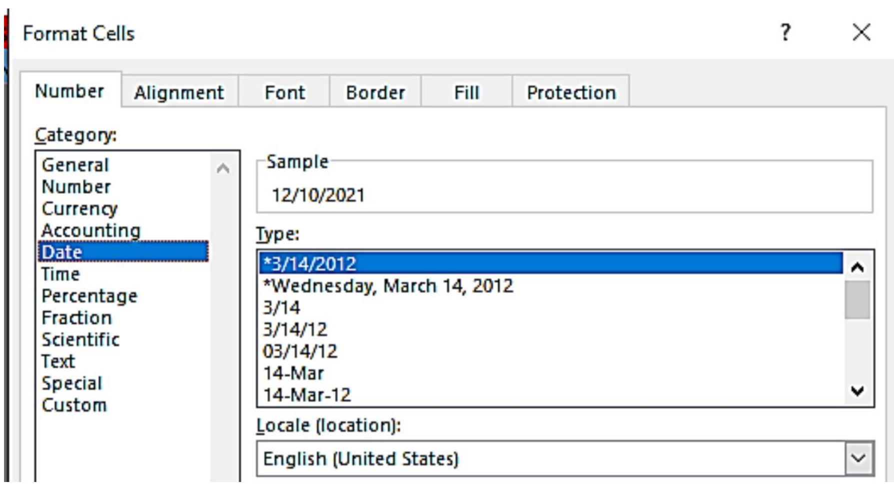
You cannot see the color preview in the Sample box. Click **Ok**. It displays on your worksheet.



	A	B	C	D	E	F	G	H
1								
2	Month	Sales						
3	January	$75	$56	$98				
4	February	$65	$89	$98				
5	March	$94	$56	$44				
6	April	$82	$43	$70				
7	May	$56	$45	$98				
8	June	$78	$23	$67				
9	July	$55	$89	$23				
10	August	$76	$9	$54				
11								

Formatting dates and time

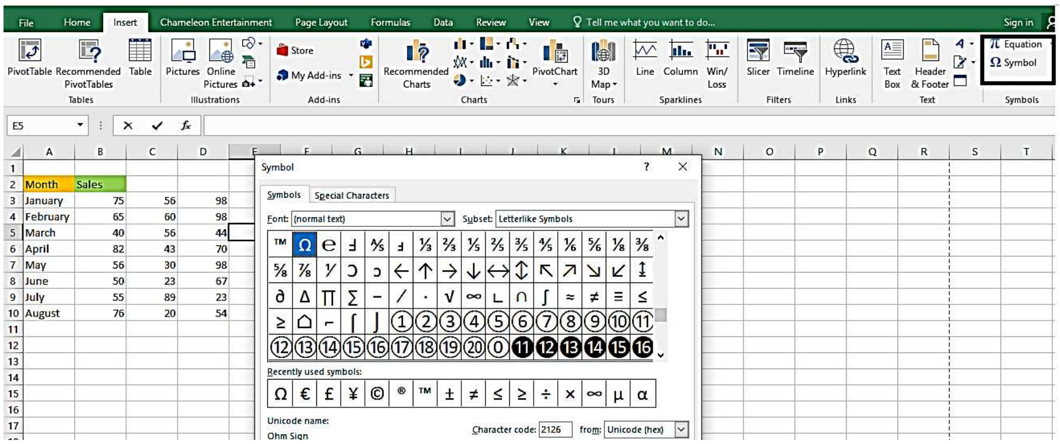
Right-click on the cell, then pick **Format Cells**. On the Number tab, pick Date or Time. Select an option. Then, click **Ok**.



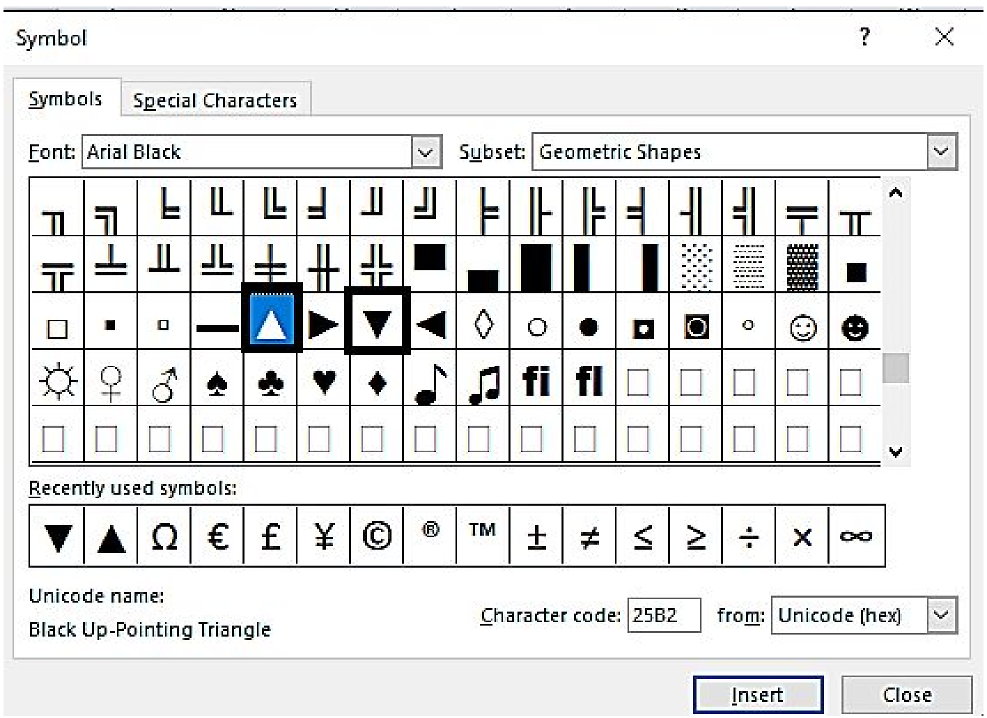
Using a symbol to enhance reporting

Including symbols in your worksheet may help you visualize your data. Here, I will go with the up and down arrows in our number formatting to indicate the increase and reductions in our data. The symbols we'll employ are Unicode symbols, which are a platform-agnostic standard that may be found on any language PC.

First, we will access the symbols by inserting them. So, click on a cell that has no data in it. Click Insert and select the Symbol icon on the Symbols group. This opens up the Symbol menu.

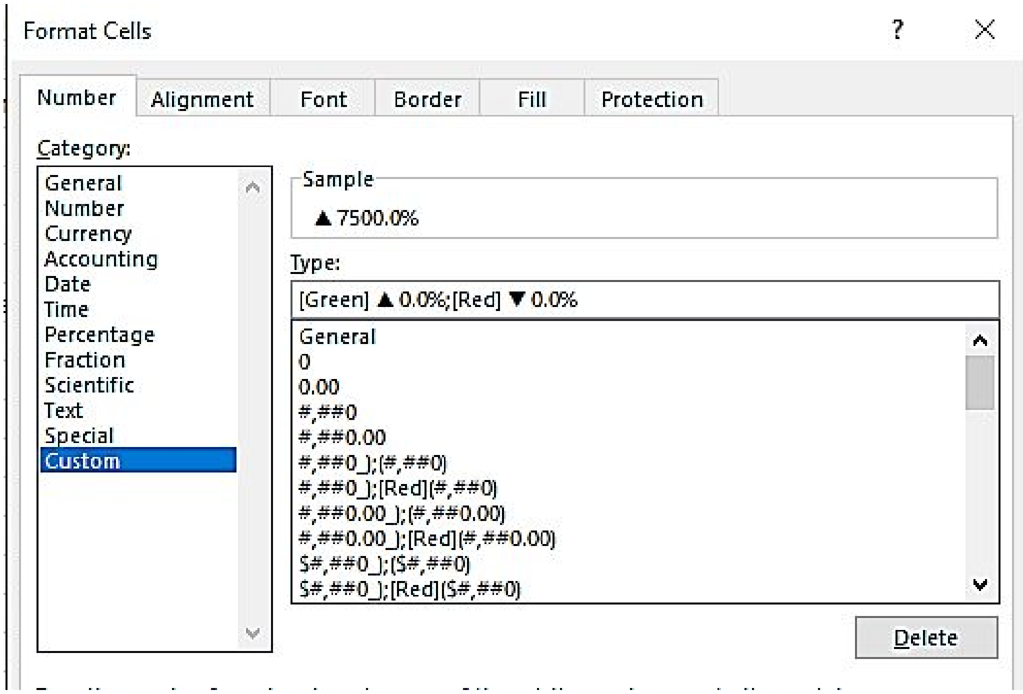


Select the font you want from the **Font box**. On the **Subset box**, choose **Geometric Shapes**. From the list of shapes, choose the **up arrow** shape and click **Insert**. Choose the **down arrow** shape and click **Insert**. Then, close the menu.

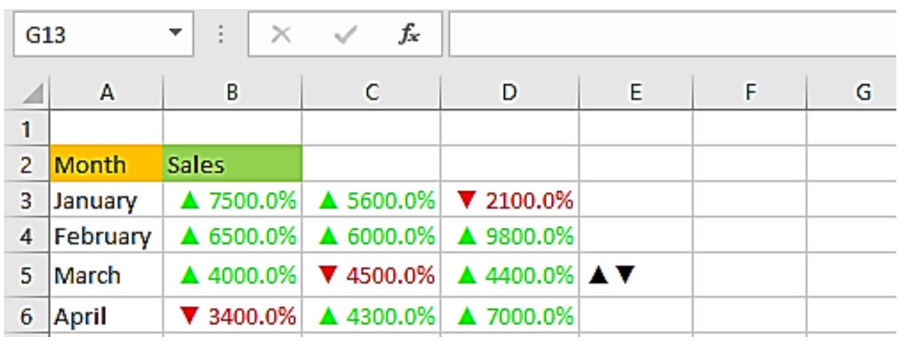


Now let's use the symbols in our formatting

Choose the data to include the symbols. Then, right-click and choose Format Cells. Select Custom on the Insert tab. In the type box, type in this format code **[Green] ▲ 0.0%;[Red] ▼ 0.0%.** Click **Ok**.



The positive numbers will change to green and the up arrow will be there. The negative numbers will change to red and the down arrow will be there.

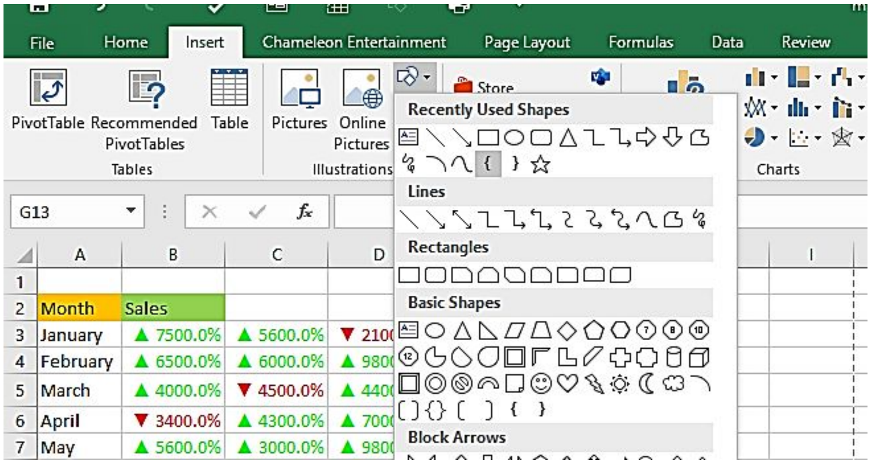


	A	B	C	D	E	F	G
1							
2	Month	Sales					
3	January	▲ 7500.0%	▲ 5600.0%	▼ 2100.0%			
4	February	▲ 6500.0%	▲ 6000.0%	▲ 9800.0%			
5	March	▲ 4000.0%	▼ 4500.0%	▲ 4400.0%	▲▼		
6	April	▼ 3400.0%	▲ 4300.0%	▲ 7000.0%			

USING SHAPES AND ICONS AS VISUAL ELEMENTS

Inserting a shape

Using shapes in your worksheet helps to make your work neat and understandable. To insert a shape, click on the Insert Tab. Click on the **Shape icon** on the illustration group. Select a shape.



Inserting SVG icon graphics

SVG means Scalable Vector Graphics. To insert them, click Insert Tab. Click on Icons. This will display different icon categories. Click on any category and select an icon. Then, click **Insert**.

You can insert more than one icon at the same time by clicking on them. You can also search for icons. Click **Insert**, the icon displays on your worksheet.

Use the Graphic Format tab to modify the icons.

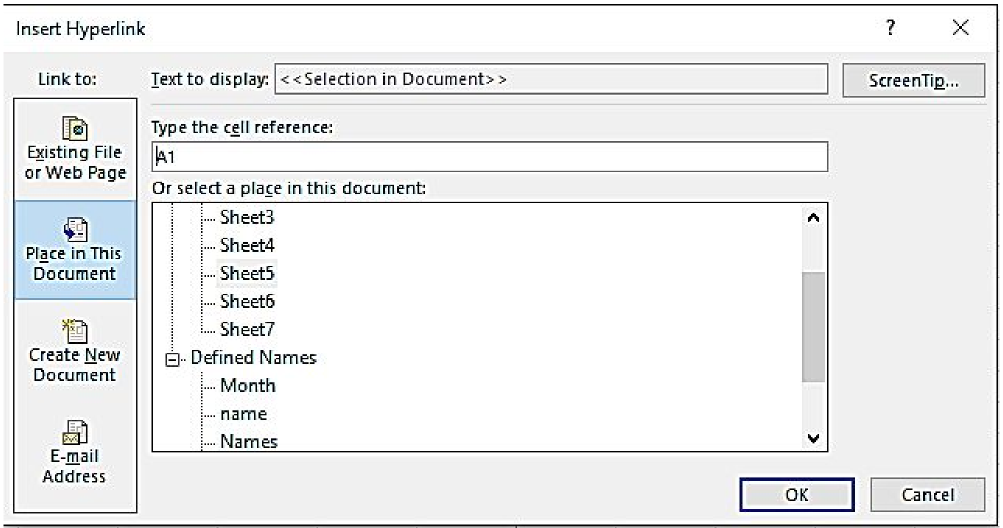
Enhancing Excel reports with shapes

With Shapes, you display a perfect presentation of your work. You can use shapes to show any common chart in Excel. Excel shapes are used to enhance the appearance of your dashboards and reports, as well as for realistic and efficient applications. We'll look at ways to make your worksheets more appealing with shapes.

Creating Custom Button Links: Creating custom button links with shapes is a wonderful way to move across worksheets, connect to reports on shared servers or just link to a webpage.

To create a Hyperlink out of a shape, simply insert the shape. After adding the shape to your worksheet, add text to it by right-clicking on the shape, then, select **Edit Text**.

Once you have added a text, press **Control key + K**.



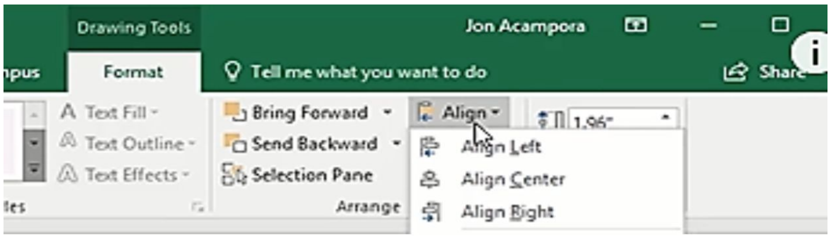
Here, I use the Place in this document option. We will choose the sheet for linking. So, choose the “**existing file or web page**” option. Then, get the location of the document or you put the address on a website.

Building Dashboards: Excel shapes most times, are used to enhance and update the appearance of data in a worksheet. Flow charts and aesthetically pleasing spreadsheets are often the first things that spring to mind when people think about shapes in Excel. Smaller forms and other shape attributes may be used to create some nice-looking dashboards.

Layering shapes to save space

The image below has different shapes on my worksheet like text box images, charts slicers, etc.

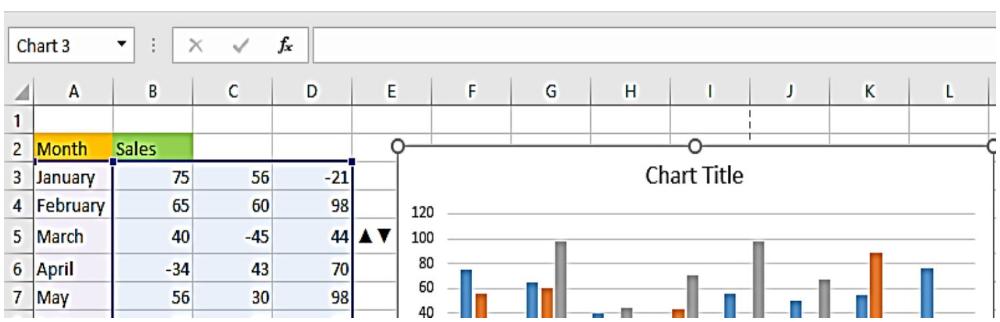
To align your shapes, use the **Align command** to align them to the top, bottom, right, or left to save some space on the worksheet. Simply select the shapes by holding down the Control key and clicking on the shapes. Then, on the Format tab, click **Align**, select an option.



Constructing your infographic widgets with shapes

Infographic is a method of presenting data or summary reports using appealing charts and pictures. They are the ability to employ external objects or visuals to visualize images. They are not like dashboards in that they demand an architectural mindset to create your infographics.

So, to create them, first select the cells, then on the Insert tab, click on Bar chart, then choose 2D Clustered Chart. we will have a chart like the one below.



Right-click and select Format Data Series. On the series option, set the Gap width to 0%. Make the chart background to be light white using the Shape Fill icon. Adjust the chart size for the image to fit in.

Creating dynamic labels

To progress beyond your basic worksheet abilities, creating dynamic charts can enhance it. The idea is to pick dynamic range as the source data. Changes and additions to the source data will be instantly reflected in the chart.

We will first create a table. So, select the data range, then, on the Insert tab, navigate to the Tables' group and select **Table**. Select the table. If your data has headers, check the box next to **My Table Has Header.** Then, click Ok.

The chart built on the table is going to be dynamic. Now, let's create a chart. Highlight the table. Then on the Insert tab, on the Chart group, click on **Column Chart** and select **2-D column chart**. When you update the table. It will reflect on the chart automatically.

Creating linked pictures

Picture link makes an image of grouped cells in form of a picture. You can move it around the worksheet as well as resize them. The picture will update as the source cells changes.

First, pick the cells and copy them by pressing **Control + C**. Pick the cell for creating the link picture. Click **Paste** (Ribbon) > select **Paste Special,** and pick **Picture Link**. The picture link will display on your worksheet.

Some do ask, the importance of creating a linked picture and when is it needed?

At first glance, picture links may appear to be a pointless function. They are, nonetheless, rather strong. Here are a few examples of how picture links may be used:

In dashboards and reports, we usually need to mix charts, tables of data, conditional formatting, and other elements on a single page. Build the different dashboard components in different spreadsheets first. Then, in the final dashboard, provide picture links to these sections. Resize and position them as desired.

In Dynamic Charts: Because picture links are just photos with a formula applied to them, you can quickly create dynamic charts and dashboards with them.

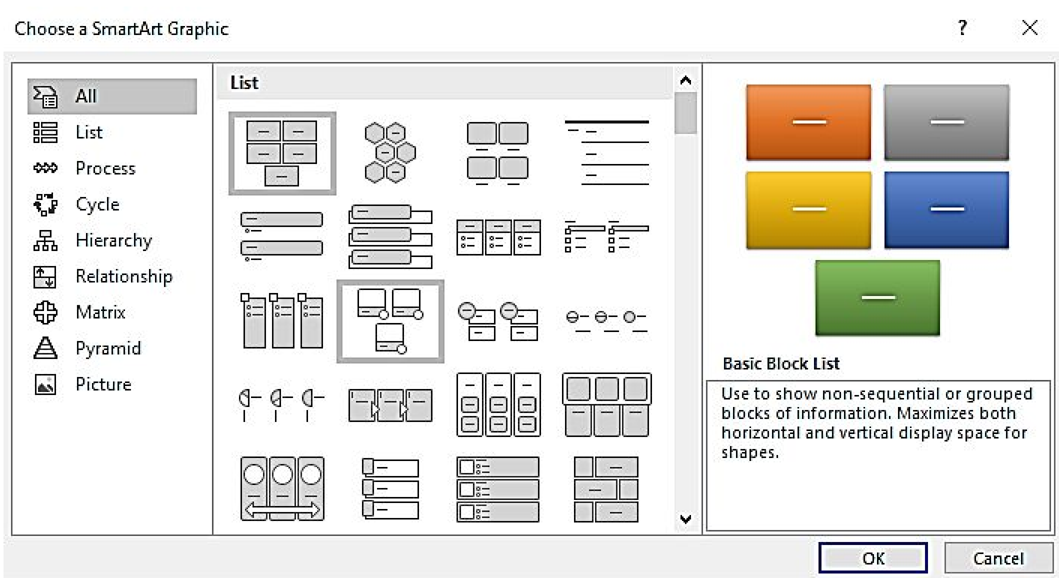
Picture link helps as proof to your data just in case someone makes some changes to the data.

USING SMARTART AND WORDART

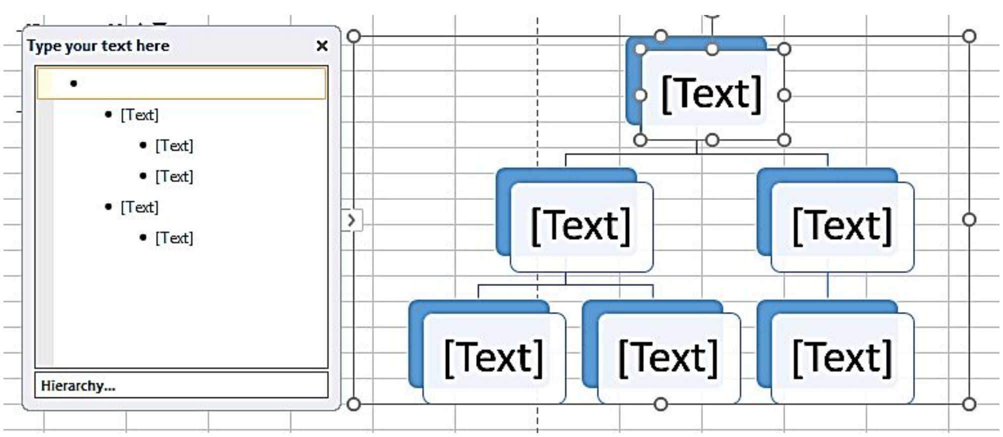
SmartArt basics

SmartArt helps you to add diagrams, captioned pictures, and visual lists in your work presentation. It comes in different forms, colors, arrangements, etc. To insert a SmartArt, click on the Insert tab, then on the Illustration group, click on SmartArt.

This will open up the SmartArt dialog box. On it, you will see different SmartArt options.



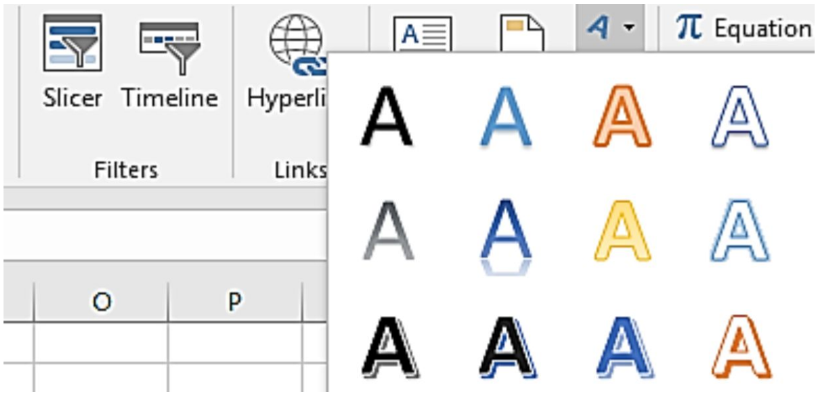
Pick any SmartArt graphics, then click Ok. Check for the image in your worksheet. On the [Text} placeholders, you can type in titles, captions, pictures.



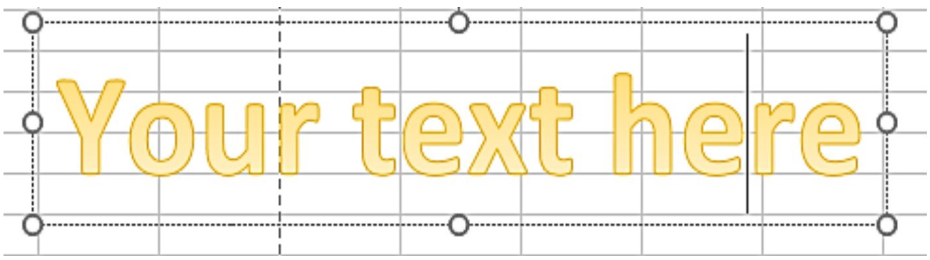
Modify the SmartArt Graphics such as changing the layout, styles, color, etc. using the SmartArt tab.

WordArt basics

Select WordArt from Insert Tab. Select a style.



Click and type in your text.



Modify WordArt with the Format menu. You move it by dragging the edges.

WORKING WITH OTHER GRAPHICS TYPES

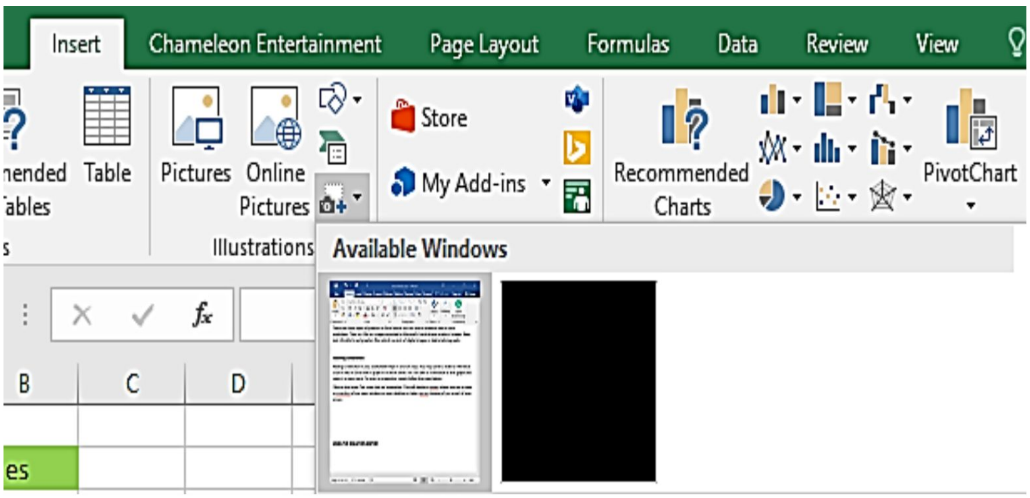
About graphic files

When most people think about worksheets, the last thing that springs to mind is art. Graphic images, when utilized with care, will not only draw attention to otherwise dull tables and lists of statistics but also improve the readability of their material. Hand-drawn visual shapes that you may add to the spreadsheet to bring attention to unusual data points.

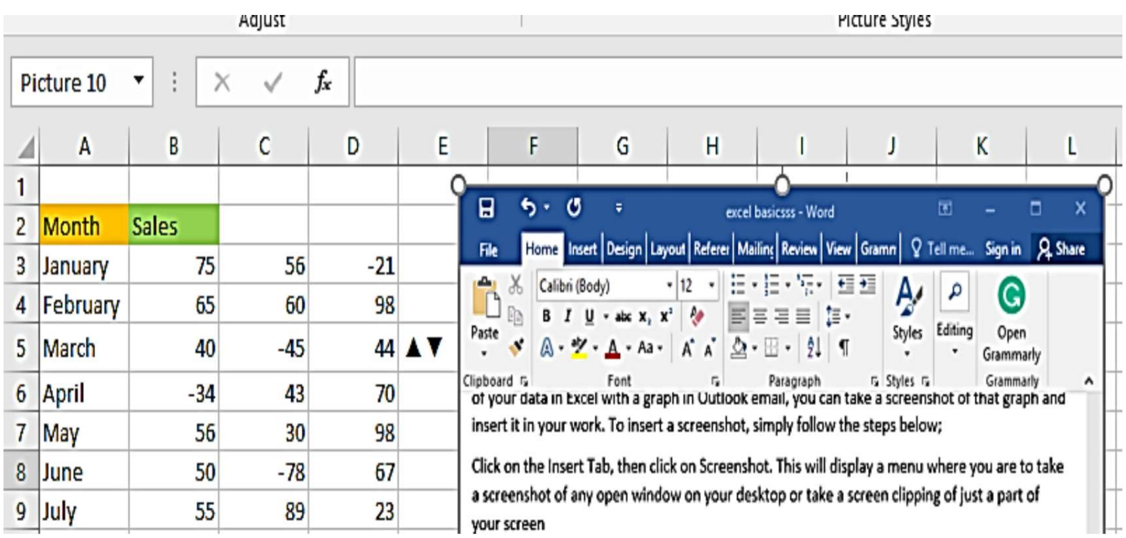
There are types of graphics in Excel for enhancing your worksheet. They are Clip art images provided by Microsoft, hand-drawn graphics (shapes, lines, text, WordArt), and graphics files that consist of digital images or digital photographs.

Inserting screenshots

Click Insert, then click on Screenshot. This will display a menu where you are to take a screenshot of any open window on your desktop or take a screen clipping of just a part of your screen



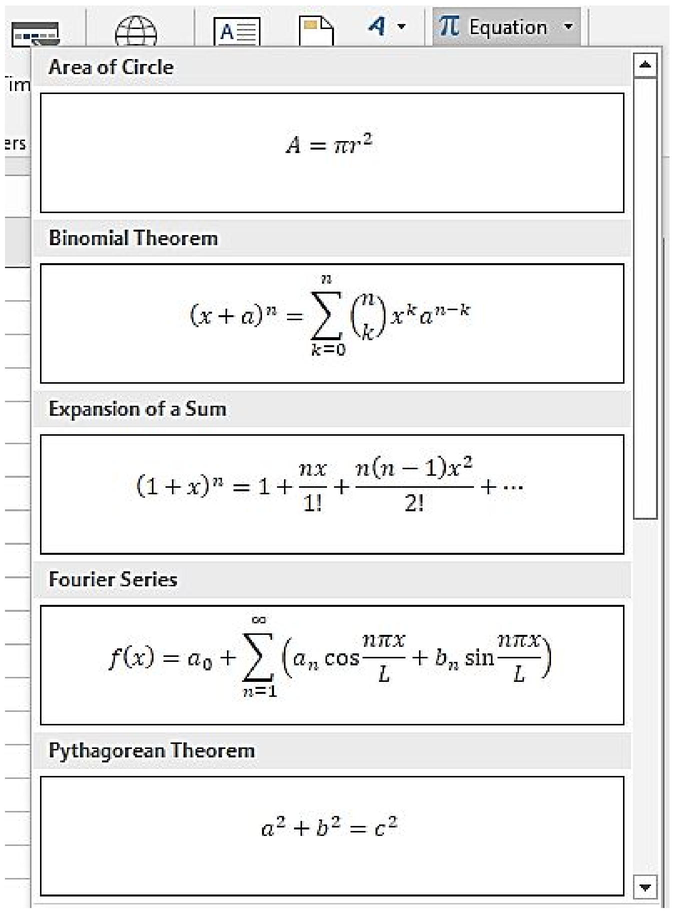
Choose any of the options and the screenshot will display. You can modify the screenshot using the Format tab.



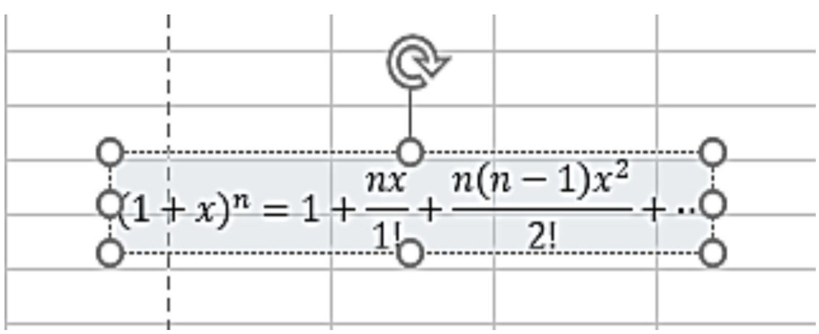
USING THE EQUATION EDITOR

The Equation editor puts in equations or format equations. To insert equations with the Equation editor, simply;

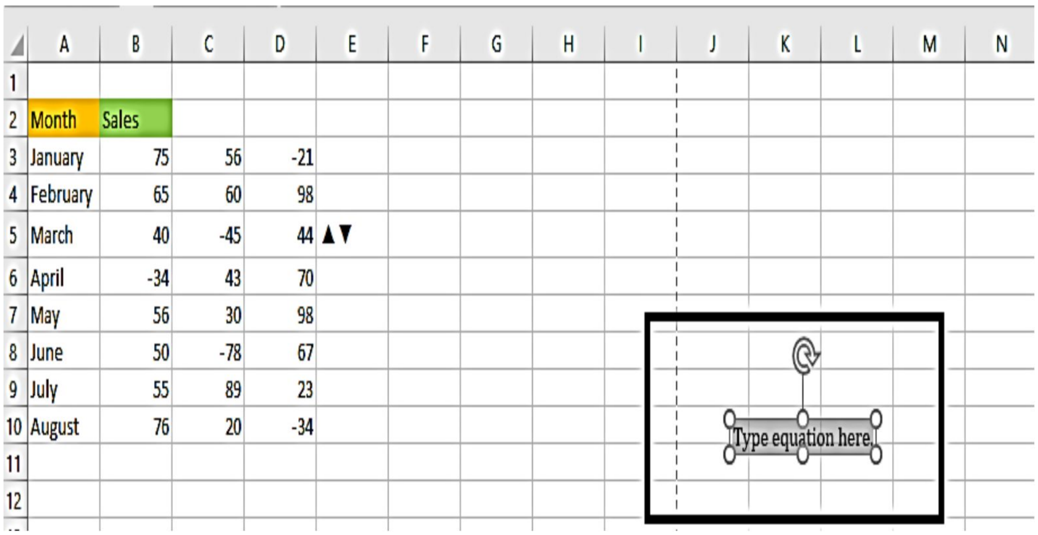
Click Insert, under the Symbols group select **Equation** and a drop-down menu will appear. This will display some of the preinstalled equations in Excel. Click on any of the equations.



Here, I selected the Expansion of a Sum Equation. Then click Ok.



You have just inserted an Equation. You can also make your equation. To do this, click on Equation (not the arrow). A text box will appear with a caption of **Type Equation here**. Modify the equation with the Drawing too and Equation tool tab.



You can right-click on the box, then select Format Shape for more modifying options.

CONCLUSION

Number formatting, like all of Microsoft Excel's tools, has a multitude of options. This chapter just skims the surface of what's possible. Number formatting may be something you're already familiar with.

This chapter looks at how users may utilize formatting methods to construct layers of visualizations and transform their data into useful representations. It explains how to develop custom number formats and gives several examples that users may use as-is or modify to meet their requirements.

Shapes are configurable graphical pictures that are available in Microsoft Office, including Excel. Scalable Vector Graphics (SVG) icons are included in Excel 2019's new icon collection. Without sacrificing picture quality, SVG graphics may be resized and formatted.

BOOK 2:

EXCEL FORMULAS & FUNCTIONS

CHAPTER ONE

INTRODUCING FORMULAS AND FUNCTIONS

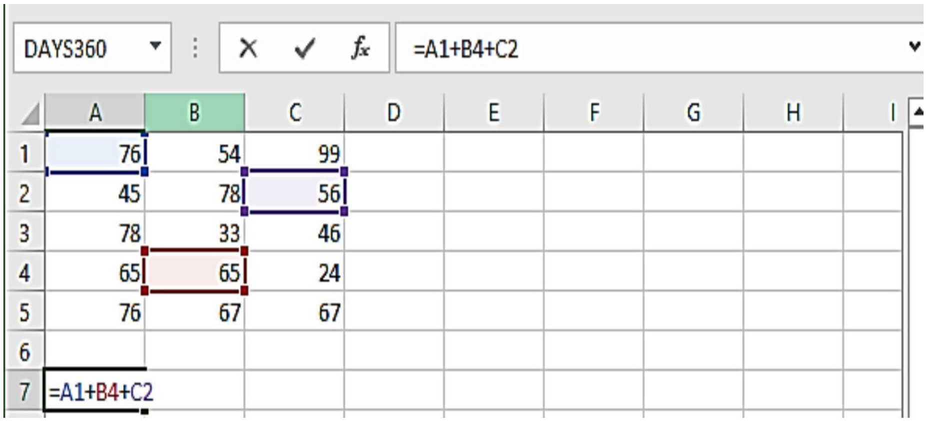
Until you create some form of connection among the numerous elements, a worksheet is just a dead sequence of values and text. You accomplish this by writing formulae that do computations and provide output. This chapter covers the fundamentals of formula construction, including how to create simple arithmetic and text formulae, how to grasp operator precedence, how to copy and move worksheet formulas, and how to use range names to make formulas simpler to develop and comprehend.

UNDERSTANDING FORMULA BASICS

You might be wondering what the formula is in Excel. The formula is defined as being anything that starts with an equal sign and is not pre-formatted as text. One of the most powerful features of Excel is the ability to calculate numerical information using formulas. Just like a calculator, Excel can add, subtract, multiply, and divide.

In Excel, every formula starts with an equal sign **(=).** This is because the cell contains, or is equal to, the formula and the value it calculates.

If you don’t put the equal sign, you cannot perform the function. Supposing you want to add 56, 65, and 76, you will have to apply the formula then you apply the function. So, put the equal sign and then find the cell reference of each of these numbers in your worksheet and put the plus sign after each cell reference. As you can see in the image below.



Equations that execute calculations on data in your worksheet are known as formulas. Whether or not the answer to your formula immediately updates when changes are made depends on how you construct a formula in Excel. A formula begins with the equal sign (=) and may include any or all of the following elements:

Function: A function is a formula that accepts one or more inputs, acts, and then returns one or more values. On a spreadsheet, functions are used to simplify and shorten formulae, particularly those that conduct long or difficult computations. A function is often made up of two parts:

1) **The name of the function**: A function's name indicates the kind of arithmetic Excel will execute.

2) **An argument**: A function's arguments are the values it utilizes to conduct operations or computations. The kind of parameter used by a function is unique to that function. Numbers, text, cell references, and names are some of the most common parameters used in functions.

Using Operators in Formulas

Every Excel formula uses the same structure i.e. it comes with an equal sign which is followed by one or more operands and is separated by one or more operators. Operands are values, ranges, function names, range names, cell references while Operators are symbols such as a plus sign for addition (+), a minus sign for subtraction (-), an asterisk for multiplication (*), a forward slash for division (/), and a caret (^) for exponents.

You can make use of spaces between the operands and operators in your formulae. It is good to make use of space because it makes the work easy to understand. You can also make use of line breaks. If you want to insert a line break, simply press the **ALT key + Enter**.

Using functions in your formulas

Following are some fundamental Excel functions to get you started, assuming you can now input and function with your favorite formulae.

1. **Excel's SUM formula**

First and foremost, the SUM function in Excel is a must-know formula. Values from several columns or rows are often combined.

=SUM(number1, [number2],...) =SUM(number1, [number2],...) =SUM(number1, [num

Example: Summing up the values of a single row, =SUM(B2-G2).

=SUM is a simple selection that adds the column values (A2:A8).

A2:A7, A9, and A12:A15 are examples of A2:A7, A9, and A12:A15. The collection sums values from A2 to A7, skips A8, adds A9, jumps A10 and A11, and then adds from A12 to A15. "This is a highly sophisticated compilation."

Note: You can alternatively express your function using a formula.

2. **The MEDIAN Excel formulas**

The average number of shareholders in a certain shareholding pool is an example of a simple average that the AVERAGE function should bring to mind.

=AVERAGE(number1, [number2],...) =AVERAGE(number1, [number2],...) =AVERAGE(number1, [

Example: The formula =AVERAGE is used to calculate an average (B2:B11). (SUM(B2:B11)/10) is likewise comparable.

3. **Excel COUNT FORMULAS**

The COUNT function keeps track of how many cells in a given range contain just numeric values.

=COUNT(value1, [value2],...) =COUNT(value1, [value2],...) =COUNT(value1, [value2

Example: COUNT is used to count the numerical values in a column (A: A). To count rows, you must change the range of the formula.

4. **Excel COUNTA Formula**

COUNTA counts all cells in a specified range, precisely as the COUNT function. All cells are tallied, regardless of their kind. It counts dates, times, strings (including logical values and errors), and empty strings or text in the same way as COUNT does.

=COUNTA(value1, [value2],...) =COUNTA(value1, [value2],...) =COUNTA(value1, [value

Example: With COUNTA, any kind of row 2-13 in column C will be tallied (C2:C13). On the other hand, COUNT cannot be used to count the number of rows in a table. COUNTA(C2:H2) will be used to count columns C to H, which will need a selection change within the brackets.

5. **Excel's IF Formula**

The IF function is often employed when you wish to sort your data according to a set of rules. Other formulae and functions may be included using the IF formula.

If the test is true, for example, the value is true and false.

Example: =IF(C2D3, 'TRUE,' 'FALSE') – IF(C2D3, 'TRUE,' 'FALSE') – IF(C2D3, ' This method checks the two numbers to see whether C3 is smaller than D3. If the reasoning is right, the cell value should be TRUE; otherwise, it should be FALSE.

=IF(SUM(C1:C10) > SUM(D1:D10), SUM(C1:C10), SUM(D1:D10), SUM(C1:C10), SUM(D1:D10)) - A lot of ins and outs in the IF logic. It starts by multiplying C1 through C10 and D1 through D10, then comparing the results. If the sum of C1-C10 is larger than the sum of D1-D10, cell values are equal to the total of C1-C10. Otherwise, C1 through C10 would add up to C11.

6. **Excel TRIM Formula**

By utilizing TRIM, you can ensure that your functions don't issue errors due to unmanaged spaces. It guarantees that the design is devoid of cavities. TRIM can only operate on one cell at a time, unlike other operations. As a consequence, your spreadsheet will be clogged with useless data.

=TRIM(text)

7. **MAX and MIN Formulas**

The MAX and MIN functions may be used to determine the maximum and least values in a range.

To put it another way,

=MIN

Example: =MIN(B2:C11) – Finds the least number between B2 and C2 in columns B and C.

=MAX(number1, [number2],...) =MAX(number1, [number2],...) =MAX(number1, [num

Example:=MAX(B2:C11) – =MAX(B2:C11) – =MAX(B2:C11) – =MAX The maximum number between the two columns B and C is also calculated.

Examples of formulas that use functions

Formulas calculate the values in a cell and it is done with the help of a function. For instance, the formula =B2+B3+B4+B5 adds up the values in cell B2 to B5. The work of a function can come into this formula to make it easier for you. The SUM function is needed here. Simply add the SUM function like this =SUM (B2:B5). So, almost every formula has a function attached to it.

Functions arguments

A function argument is a particular parameter that is sent to the function. Let’s use the VLOOKUP function as an example. This function requires four arguments as seen below;

=VLOOKUP (value, table, col_index, [range_lookup])

Not every argument is required. Some are optional. You will know an optional argument with the square brackets that it comes with. Just like in the VLOOKUP function above, the last argument [**range_lookup**].

Some of the Excel functions go with more than one optional argument. The multiple arguments go with the ellipses (…). The COUNTIFS function is a good example. See below;

=COUNTIFS (range1, criteria1, [range2, criteria2],…). So, you can decide to include more arguments: range4/criteria4, range7/criteria7, and so on.

More about functions

Some tips are necessary when using functions. When it comes to drafting and modifying Excel formulas, there are a few factors that might help you be as efficient as possible. You can see all of your formulae at once and correct each one individually. Add-in wizards may aid in the creation of functionality. Some of the tips are listed below;

Priority for the master operator

One of the most crucial aspects of formula writing is getting the operators right, and I'm not talking about phone company operators. This has to deal with mathematical operators, such as plus signs and multiplication signs, and where the parenthesis should be. The sequence in which operations are conducted, known as operator precedence, may significantly impact the outcome.

This phrase serves as a mnemonic for the following information:

- Settings
- Exponents
- Multiplication
- Division

- Addition
- Subtraction

As a result, parentheses/settings take priority (first) while subtraction takes precedence (last). To be honest, multiplication takes priority over division, and addition takes priority over subtraction, but you get the picture!

The formula =1 + 2 15 equals 31 is an example. If you believe it should be 45, you should pay a visit to your aunt! If you use parentheses like this: =(1 + 2) 15, the answer is 45.

Show Formulas

It's difficult to read your formulae without accidentally modifying them if you haven't noticed. This is because if you're in **"edit"** mode and the current cell includes a formula, the formula might include the address of any other cell you click.

Isn't it simpler if you could simply glance at all of your formulas? There's a way out. It's straightforward. Click File in the Excel workspace's upper left corner, then Choices, the Advanced tab, and the Display options for this worksheet section.

The Show formulae in cells instead of computed results check box is worth noting. This box instructs Excel to show the formula itself rather than the computed result in any cells with formulae. The worksheet that presents the formulae is shown in the image below. Rep these steps and reject the option to return to regular display.

Fix Formulas

Assume your worksheet has certain inaccuracies. Don't be alarmed! Even the savviest users experience this, and Excel can help you find out what's going wrong. The Error Checking button is located in the Formula Auditing section of the Formulas tab. The Error Checking dialogue box appears when you click the button, as illustrated above. That is, if your spreadsheet has any problems, the dialog box will show. Otherwise, it simply displays a message stating that the error check has been completed.

The dialog box opens when there are mistakes and remains visible as you work on each one. Before the dialog box closes, use the Next and Previous buttons to cycle through all of the errors. You decide what action to take for each mistake it discovers:

- **Help on This Issue:** This takes you to the Help system, where you can look up the subject for the error you're having.
- **Show Calculation Steps:** The Evaluate Formula dialog box appears, and you may observe the formula being computed step by step. ***(NB: This allows you to pinpoint the exact step that resulted in the mistake)***.
- **Ignore Error:** Excel may be incorrect. Ignore the mistake.
- **Edit in Formula Bar:** If you don't need any more assistance, this is a simple approach to fix the formula yourself.

There is also an Options button in the Error Checking dialog box. The Formulas tab of the Excel Options dialog box is opened by clicking the button.

Note: You may choose parameters and criteria for how mistakes are identified and triggered on the Formulas page.

Use absolute references wherever possible

If you want to apply the same formula for a group of cells, such as those in a column, the ideal technique is to type the formula once and then use the fill handle to drag it down to the other cells. The issue is that any relative references change when you drag the formula to different places.

This is often the objective. Each cell in the formula column often relates to its neighbor in the data column when there is one column of data and an adjacent column of formulae. If, on the other hand, all of the formula cells refer to a cell that isn't nearby, the objective is typically for all of the formula cells to refer to a constant cell reference. Use an absolute reference to the cell to make this operate properly.

Apply conditional formatting to your documents

Conditional formatting allows you to apply a certain format to a cell when a condition is true, similar to how the IF function returns a specific value when the first parameter condition is true and a different value when it is false. A drop-down menu with several conditional formatting choices may be found in the Styles section of the Home tab.

This diagram depicts some conditionally formatted values. When you use conditional formatting, you may provide the criteria and the format that will be used if it is fulfilled. For example, if the value in the cell is larger than 100, you may request that it be shown in strong italic.

The conditions are established as rules. The rule types are as follows:

- Format all cells according to their contents.
- Only format cells that include.
- Only the top or bottom ranking values should be formatted.
- Only the numbers that are above or below the average should be formatted.
- Only format values that are unique or duplicate.
- To identify which cells to format, use a formula.

Formatting may influence the following when the condition is true:

- Borders
- Font options (style, color, bold, italic, and so on)
- Fill (the color or pattern of a cell's backdrop)

Validate your data

Data Validation is found in the Data Tools section of the Data tab. Data Validation allows you to apply a rule to a cell (or cells), requiring that all entries follow the rule. A cell, for example, may be programmed only to accept integer entries between 50 and 100.

ENTERING FORMULAS INTO YOUR WORKSHEETS

Entering formulas manually

- First, pick the cell for the formula.
- Then, enter an equal sign **(=)** in the cell.
- Then, put in the formula's operands and operators. Most times, this comes in with the open bracket and closed brackets.

- Then, press **Enter**.

For example:

=SUM(29, 67, 89)	This will add the numbers you have mentioned here.
=SUM(B15:D15)	This will add all the cells from B15 to C15
=SUM(B15, D15, E17)	This will add the cells B15, D15, and E17.

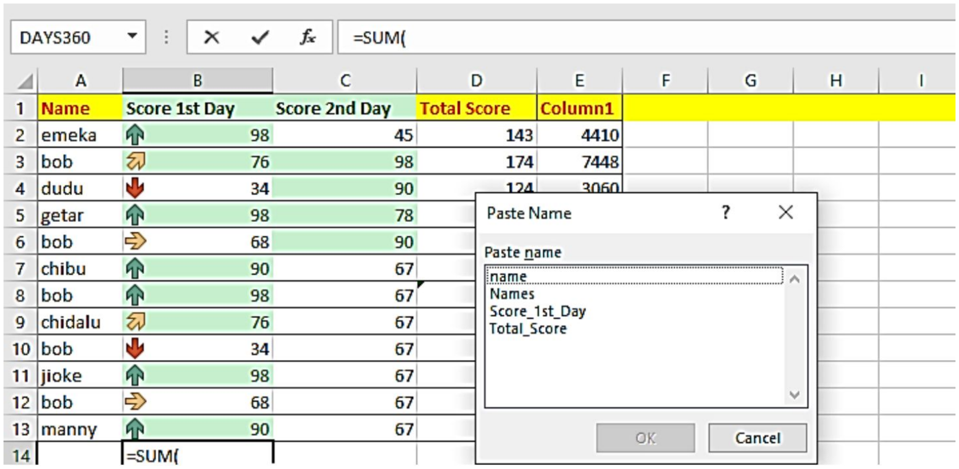
Entering formulas by pointing

You can make use of the mouse to enter formulas in Excel. To do this, you have to place some of the icons for the formulas in your Quick Access Toolbar. So, right-click on the **Quick Access Toolbar** and select **Customize Quick Access Toolbar**. Click the down arrow on the **Choose Command from** option and select **Commands Not in the ribbon**. Then, add the icons for plus, divide, minus, exponents, multiply, left parenthesis, and right parenthesis.

Then, the icons will be displayed in the Quick Access Toolbar. To put in the formulas, simply click on the formula icon you want to use as you type in the values/number you want to calculate.

Pasting range names into formulas

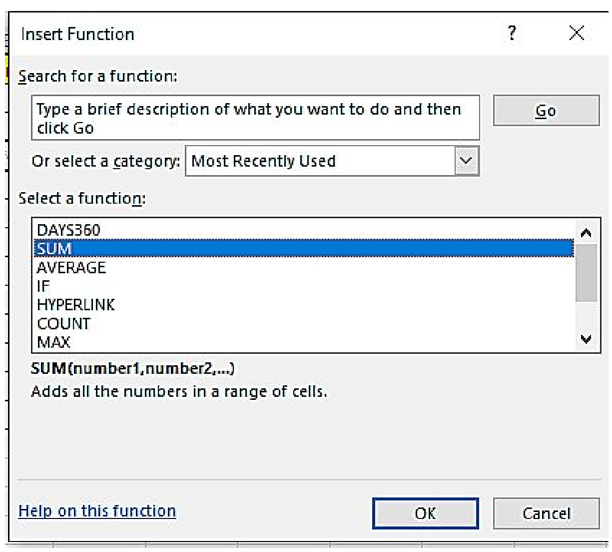
- To do this, first, enter the beginning of the formula. Here, I used the SUM formula.
- Navigate to the ribbon and click Formulas. Select Defined Names, Use in Formula, and Paste Names. Then, choose the name. Click **Ok**.



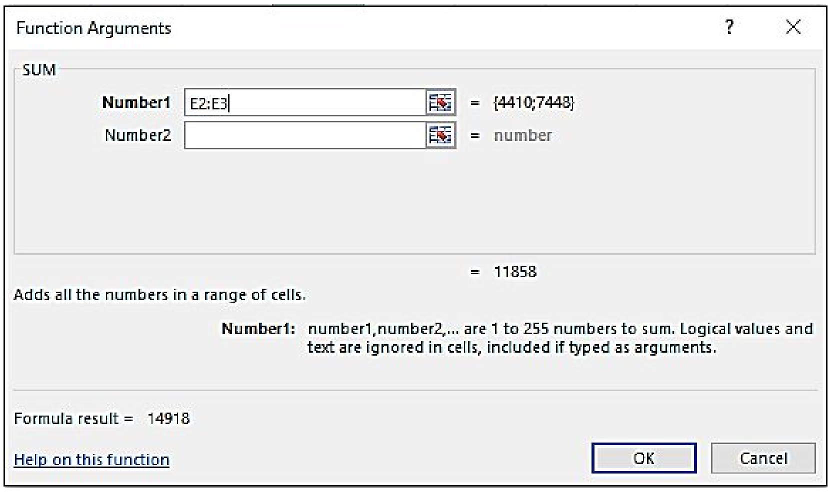
Inserting functions into formulas

Select the cell you want to put in the formula. Select the **Formula** tab and click **Insert Function**.

This will open up the **Insert Function** Dialog box. You can **select a category** or **search for a function**. Here, I selected a function which is the **SUM** function. Now, press **OK**.



The Function Argument box will display. In the Number1 box, choose the number or the number range. You can decide to type in the range. If you have more than one range, then you can select them from other Number options. Choose OK.



The result will be displayed in the Function Argument box just in case you don't need the output in your worksheet. So, choose to **cancel** if you don't want it. Select OK to see the output in your worksheet.

A	B	C	D	E	F
Name	Score 1st Day	Score 2nd Day	Total Score	Column1	
emeka	98	45	143	4410	
bob	76	98	174	7448	
dudu	34	90	12	14918	
getar	98	78	176	7644	
bob	68	90	158	6120	

Function entry tips

1. **AutoComplete and Tab**

When you start typing a function name after entering an equal sign (=), Excel uses AutoComplete to compare the text you input against a list of accessible functions. Below the cell, you'll see a list of similar functions. With each letter you enter, the selection of potential functions shrinks.

You may pick a function by double-clicking it or by using the down arrow key and pressing Enter. Press Tab to add the beginning parenthesis or bracket after you've typed the function.

2. Leave the closing parenthesis or brackets to Excel.

You don't have to input the final parenthesis or brackets when you're typing a basic formula. If you type the formula below and click Enter, Excel will automatically include closing brackets (as well as capitalizing the cell references):

=SUM(c1:c20

When the formula has many sets of parentheses or brackets, this won't function.

3. Double-click the Fill handle to copy the formula down.

It's usual practice to replicate formulae from the first to the final cell in a column. The Fill handle is mostly used to complete the other parts of a cell with a particular formula that will correspond with the cells. It makes it easier to input functions at once.

4. Switch from relative to absolute cell references quickly.

Relative cell references are Excel's default kind of cell reference. A1 is a relative identifier, for example. You may not want a cell to alter when you duplicate it, use dollar signs ($) before the column and row numbers. $A$1 is an absolute reference, which means it won't change if it's duplicated. F4 is a shortcut for fast changing the chosen cells in a formula to absolute references.

5. Choose arguments using the formula hint pop-up.

The formula hint pop-up may be used to pick arguments whenever you're typing a formula that includes an Excel function.

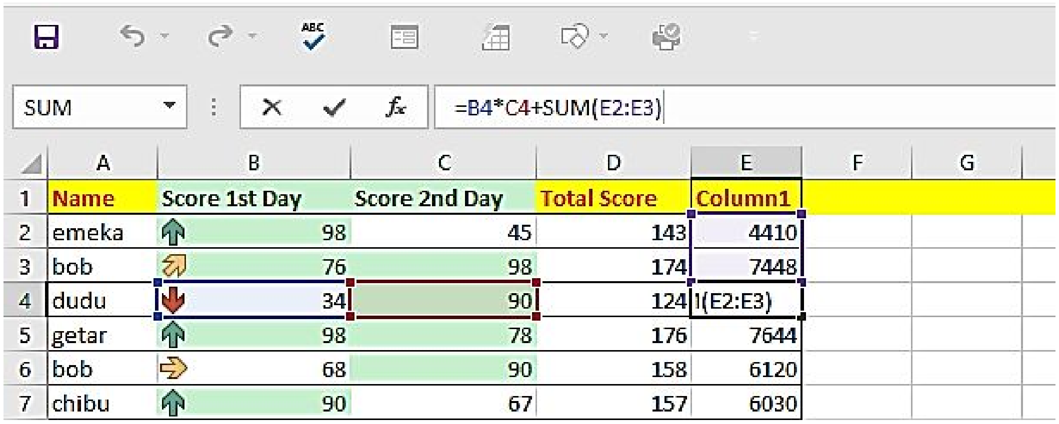
Begin by using the function to input the formula. Below the Formula Bar or the cell, a pop-up display. Click on the FX icon in the Formula Bar or the cell whose parameter you wish to pick to quickly select arguments. Excel will reveal all parameters in a hint pop-up for that function.

Select the argument you wish to choose from the pop-up menu. Even if the argument includes additional functions or formulae, Excel will choose the full argument. Substitute the value(s), cell(s), or range of cells for the argument.

Editing Formulas

You might have made a mistake while inserting formulas in your cells. You can easily modify them. Simply select the cell that has the formula which you want to modify.

Then, click on the **Formula bar.** When you do this, the cell references for that formula will be highlighted.



Depending on what you want to modify. It might be the operator or the cell references. Simply click on the one you want to modify and enter in the correct operator or reference. You can choose the correct cell to replace a cell reference.

USING CELL REFERENCES IN FORMULAS

Changing the types of your references

There are two types of references in Excel which are Absolute and Relative references. In relative reference, in a formula, the cell address is determined by the relative location of the cell containing the formula and cell referred to. The reference automatically updates you when you replicate the formula. This reference takes the form of A1. This is the default cell reference for Excel.

The Absolute cell reference is the precise cell address in a formula. It is independent of the cell that carries the location of the formula. It is written with a dollar sign preceding it such as $A$1. When you press F4 once, it will change to the relative cell. Press F4 twice to change to a mixed reference that is if the row is locked.

Referencing cells outside the worksheet

While you are working in Excel, you may want to bring in data from another worksheet. You can do that easily. The best way is by creating a relationship between the two worksheets. You do this with what is called External reference. Follow the steps below to do so;

To refer to an individual cell, simply enter the name of the worksheet, put an exclamation mark, and then put the cell address. For example, assuming you want to refer to cell B2 which is in Sheet3, simply put it as **Sheet3!B2**. Making a reference to a range of cells still follows the same process. Put in the Sheet name, an exclamation mark, then the range cell address.

Referencing cells in other worksheets

You can do so with the steps above but there is a faster way of doing so. It is done by pointing out the cell in the other worksheets.

- You are to first enter the formula in a cell.
- Navigate to the other sheet and choose the cell or range of cells for reference.
- Typing in the formula, then pick Enter.

Let's say you are to know the Value Added Tax to a sale in another sheet, and you have your sales number in Sheet sales in another sheet. Simply enter in the formula =18%* in cell G2 on the VAT sheet. Then, navigate to the Sales sheet, select cell G2. The external reference will be added by Excel.

Referencing cells in other workbooks

You can reference a cell in another workbook whether it is closed or open. For an open workbook, put in the name of the workbook in a square bracket, enter the name of the Sheet with an exclamation mark next to it, then enter the cell address. For instance, you want to refer to cells E2:E5 on sheet May and the worksheet name is Products.xlsx, simply enter it this way **[Product.xlsx] May! E2:E5.**

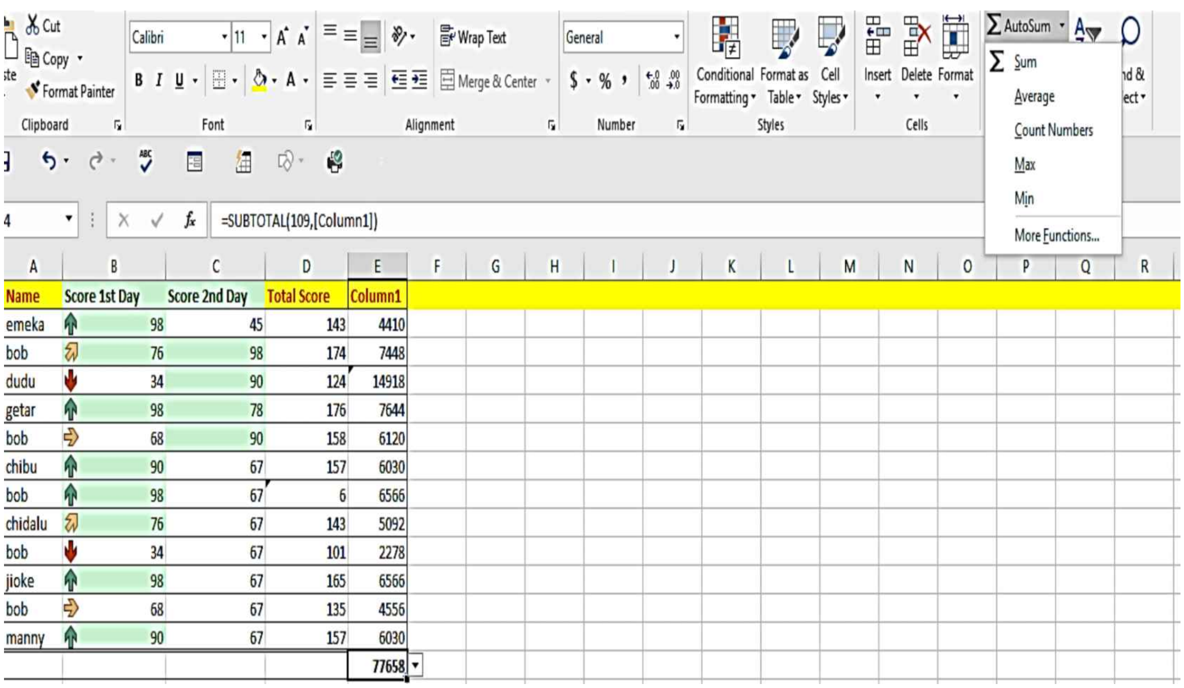
USING FORMULAS IN THE TABLE

Summarizing data in a table

There are different ways you can summarize your data in a table and this will make your work very arranged. Some of the ways are listed below;

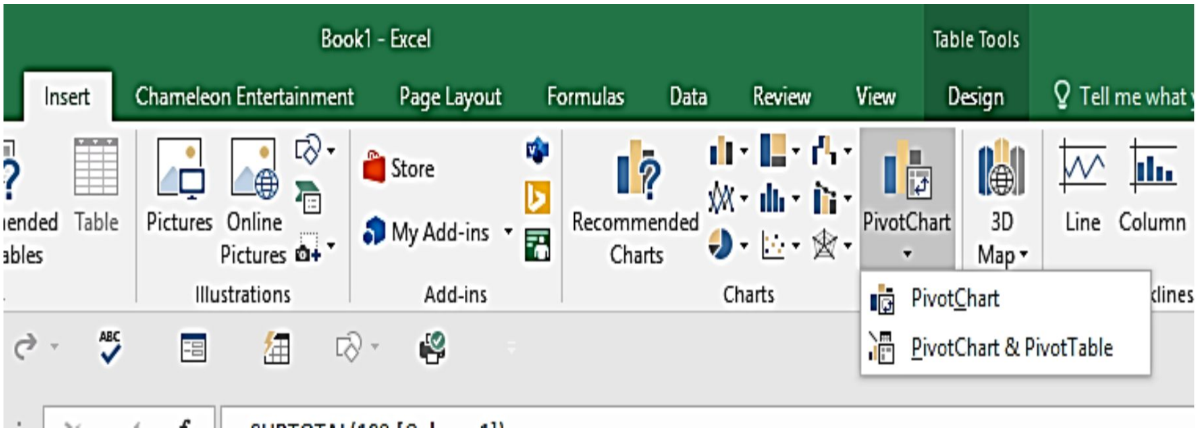
1. Sort: If all you need is a fast glimpse at organized data, the simplest method to summarize data would be, to begin with, a basic sort. Furthermore, many summarizing jobs need sorted data. If users are unaware of this, the analysis produced will be erroneous. If feasible, simplify any needed sort process while developing workbook apps for others. If you don't want to utilize automation, make sure your employees are well & informed of this information. It'll play an important role between accurate information and a jumble.

2. AutoSum: This is a good method of data summarization. Just choose a cell below or to the right of a value range. Then, pick AutoSum. A Sum function will be inserted and it will give a reference to the data above the range of values or the left of the range of values. However, you can make use of other functions like Count(), Average(), Maximum(), etc.

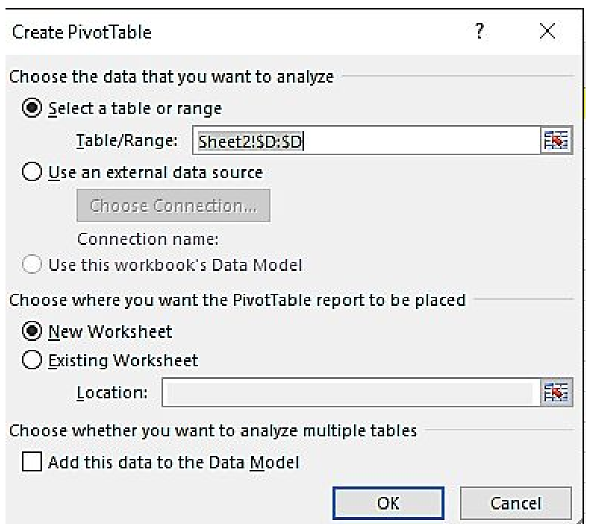


3. Pivot Table: This option has more impact in structuring your data rather than a summary, though they still have some good summarizing options. Below is an example of how it works;

First, pick the data range. Choose **Insert** and select **PivotChart**. Then, click **PivotChart & PivotTable.**



On the dialog box, select the data you want to summarize, analyze and arrange. You can choose to analyze more than one piece of data. Then, pick **OK**.



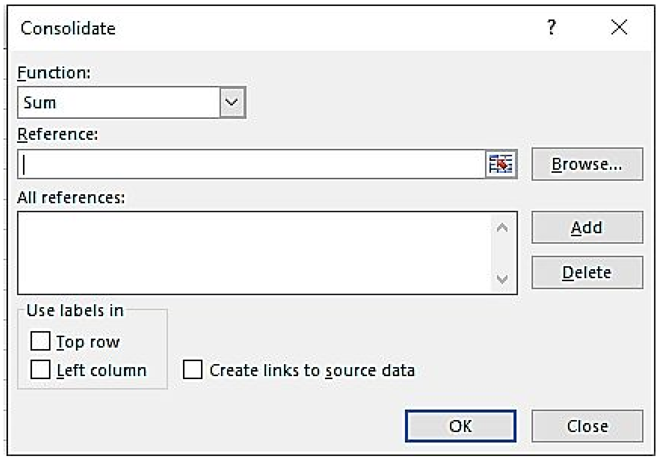
The pivot table will appear in your worksheet and on it, you can make some changes to your work such as regrouping the table.

4. Consolidate: This feature is used for merging and summarizing data in multiple workbooks. It is also used to summarize data that is in a particular file. To use this feature, you have to be sure of the following;

- The columns must have a range name and a heading.
- The values to be summarized have to be on the left of the values to be summarized.

Click the upper left anchor cell in which the summary is to show. Select the Data tab and pick **Consolidate.**

In the dialog box, select the right function from the Function menu. Put in the range name of the data you are summarizing. Pick the options you need from the Use Labels option. Press **Ok**.



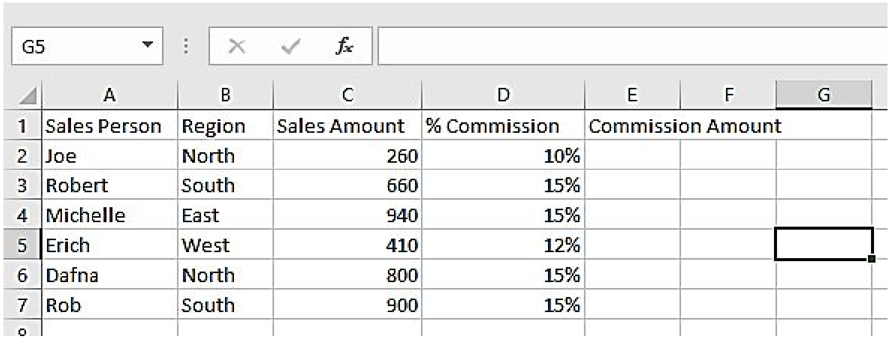
The summarized data of your work will be displayed.

Using formulas within a table

In Excel, after you have created a table, a name is given to that table and column header automatically by Excel. While adding formulas in the Excel table, the names are displayed automatically when you do so. See an example: **=SUM(F2:F7) and =SUM(Sales[Profit]).**

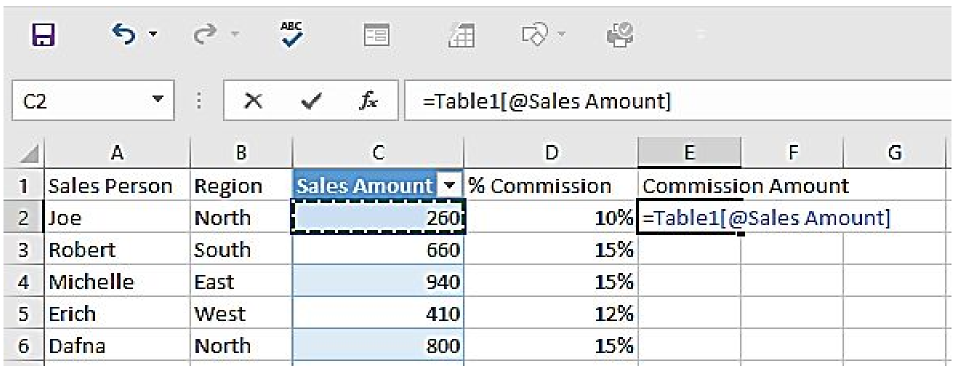
Excel will use the name of the table and columns rather than the cell references. A structured reference is a collection of table and column names. When you update or delete values in the table, the names in structural references change. Structured references can emerge when you build a formula that refers to table data outside of an Excel table. In a big worksheet, the references might help make it simpler to find tables.

Select the cell you want to add a structured reference rather than typing the cell reference in the formula. An example is displayed below; we will be making use of the data sample in the image below.



	A	B	C	D	E	F	G
1	Sales Person	Region	Sales Amount	% Commission	Commission Amount		
2	Joe	North	260	10%			
3	Robert	South	660	15%			
4	Michelle	East	940	15%			
5	Erich	West	410	12%			
6	Dafna	North	800	15%			
7	Rob	South	900	15%			

First, you are to create a table. So, pick the cells and press **Control Key + T**. Check the box next to My table has headers option. Enter an equal sign in cell E2 and select cell C2. You will see the structured reference **[@Sales Amount]]** display after the equal sign.



C2 =Table1[@Sales Amount]

	A	B	C	D	E	F	G
1	Sales Person	Region	Sales Amount	% Commission	Commission Amount		
2	Joe	North	260	10%	=Table1[@Sales Amount]		
3	Robert	South	660	15%			
4	Michelle	East	940	15%			
5	Erich	West	410	12%			
6	Dafna	North	800	15%			

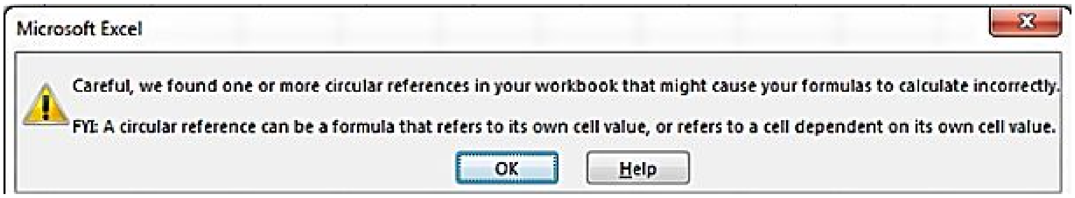
Referencing data in a table

Simply type in the formula and ensure that you do that with an equal sign preceding the formula. Then, on the first reference, choose the cell or the range of cells in the table. The column name will be chosen by Excel which will create a structured reference for you. Then, enter the closing parenthesis. Hit Enter. The formula will be entered by Excel in the column if the formula was generated inside the table.

CORRECTING COMMON FORMULA ERRORS

Handling Circular references

Sometimes when you are handling your data and values in Excel using formulas, you experience some error messages just like the one in the image below;

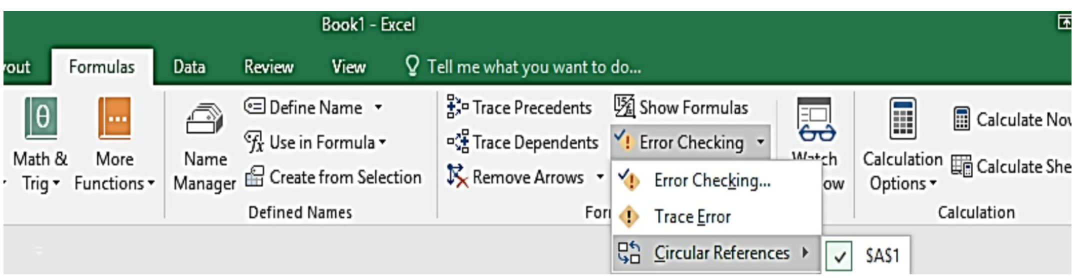


If you get the following warning, choose Help for additional details, or select OK or the x button to end the message window. Excel shows a zero (0) or the latest computed value in the cell after you shut the dialog window. Yes, in certain situations, a circular reference formula might finish successfully while attempting to compute itself, and whenever this occurs, Microsoft Excel delivers the result from the most recent valid computation.

Simply said, a circular reference occurs when you have a formula in a cell that utilizes the cell (in which it was inserted) to do the computation. Let's say in cell B1:B5, there is a dataset. Then, you use this formula **=SUM(B1:B6)** in cell B6; you will get a circular reference warning. WHY? This occurred because you want to add the values of cell B1:B6, and the result should be in cell B6.

So, how do you discover a circular reference?

Open the worksheet containing the circular reference. Select the **Formula** tab and choose **Error Checking**. Select Circular References and this will display to you the cell which contains a circular reference. Then, click on the cell option displayed for you so you can know the cell.



There are things you should note when handling circular references. They are listed below;

- The circular reference may not be in the active sheet and this will only display the circular reference but will not display the cell address.

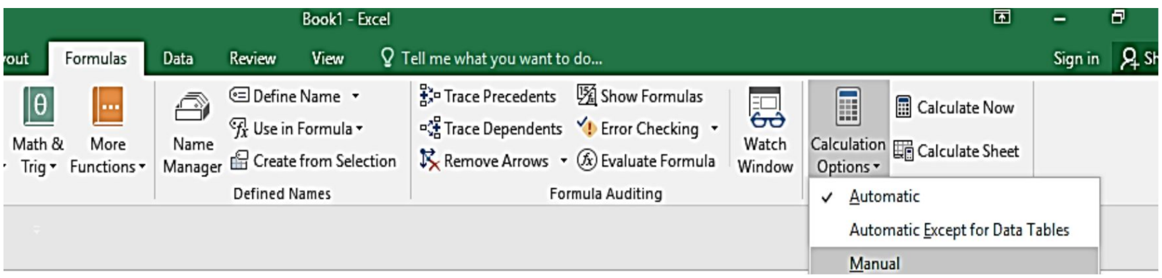
- When you get that warning sign as seen earlier, and you close the box, likely, the box won't appear again.

- This prompt appears whenever you open a workbook that contains the circular reference.

Specifying when formulas are calculated

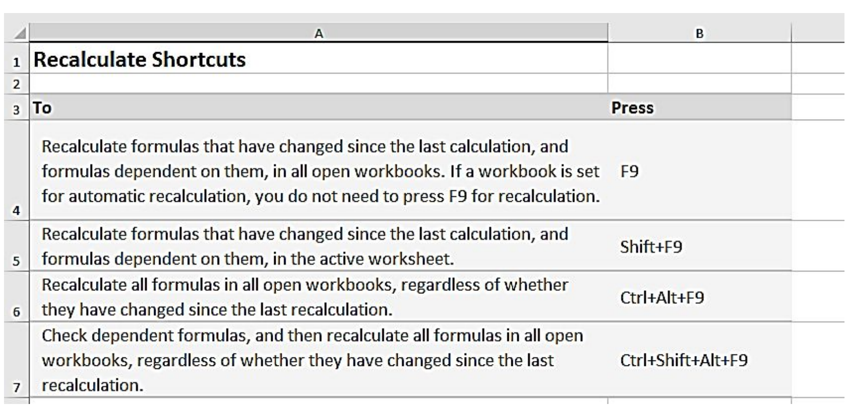
There are different calculation modes in Excel. Sometimes, you may be calculating some stuff but they don't calculate automatically. This might be because you are not using the right calculation option. You need to know the calculation mode that is in order to avoid this issue.

To do this, go to the **Formula** tab and choose the **Calculation Option**. You will see the three calculation options that you have.



When the option is set to **Automatic**, it means that your formulas will calculate automatically while if it is set to **Manual**, it will not calculate automatically. The settings you choose here will apply to every workbook.

There are shortcuts for calculating your works with the Manual mode. See the image below.



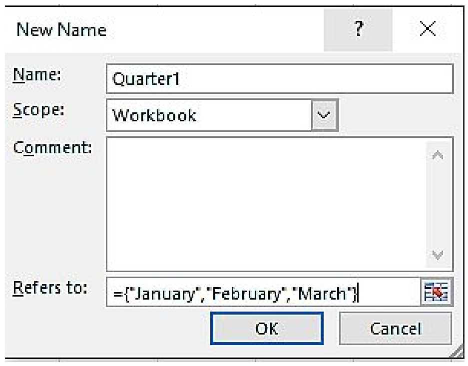
	A	B
1	Recalculate Shortcuts	
2		
3	To	Press
4	Recalculate formulas that have changed since the last calculation, and formulas dependent on them, in all open workbooks. If a workbook is set for automatic recalculation, you do not need to press F9 for recalculation.	F9
5	Recalculate formulas that have changed since the last calculation, and formulas dependent on them, in the active worksheet.	Shift+F9
6	Recalculate all formulas in all open workbooks, regardless of whether they have changed since the last recalculation.	Ctrl+Alt+F9
7	Check dependent formulas, and then recalculate all formulas in all open workbooks, regardless of whether they have changed since the last recalculation.	Ctrl+Shift+Alt+F9

USING ADVANCED NAMING TECHNIQUES

Using names for constants

Navigate to the **Formulas** tab and select **Define Name**. The **Name box** will open and on it, enter in the name for the constant.

Move down to the "**Refers to"** box and put in the constant. Here, I made use of **={"January","February","March"}**. Then, press Ok.

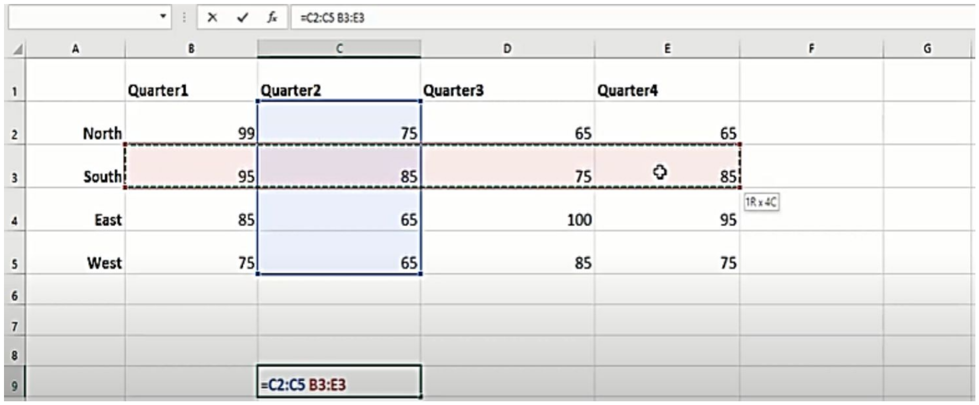


Then, choose the cell for the constant. Then, navigate to the formula bar and put in an equal sign. Then, enter the constant's name. Here, my constant's name is Quater1. Don't forget to put the equal sign. **=Quarter1**. Then, hit **Enter**.

Using range intersections

Range intersections are individual cells that two ranges have in common. If you have two named ranges, you can use the intersection to reference individual cells. When you include a space character between two cell ranges, this means that you want to return the intersection.

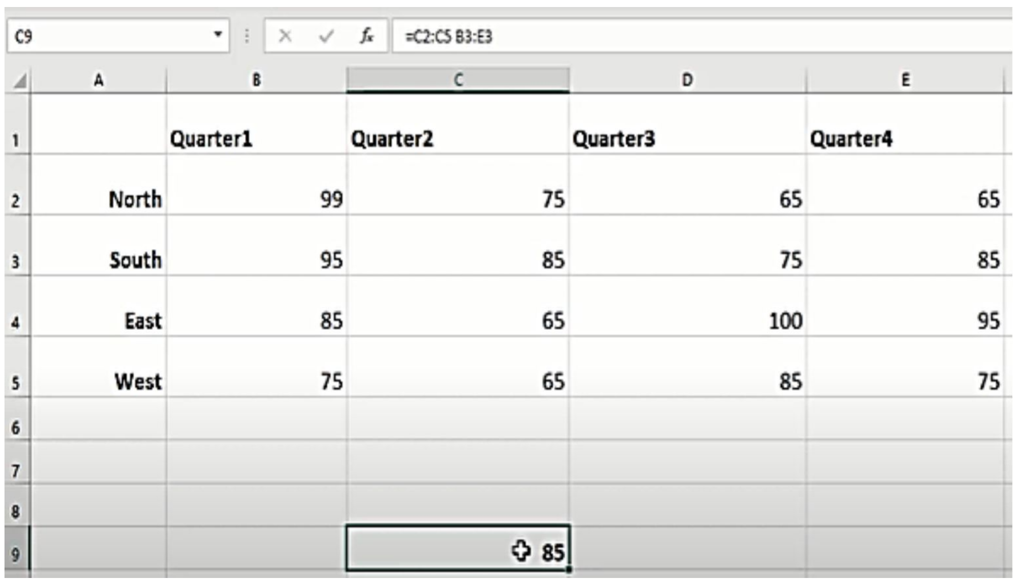
A space character is known as Intersection Operator. This operator can be used to return the intersecting value of two correlating cell ranges. For example, select cell 9 and press the equal to sign. Select the range C2 to C5. Press the Spacebar and then select range B3 to E3.



=C2:C5 B3:E3

	A	B	C	D	E
1		Quarter1	Quarter2	Quarter3	Quarter4
2	North	99	75	65	65
3	South	95	85	75	85
4	East	85	65	100	95
5	West	75	65	85	75
9			=C2:C5 B3:E3		

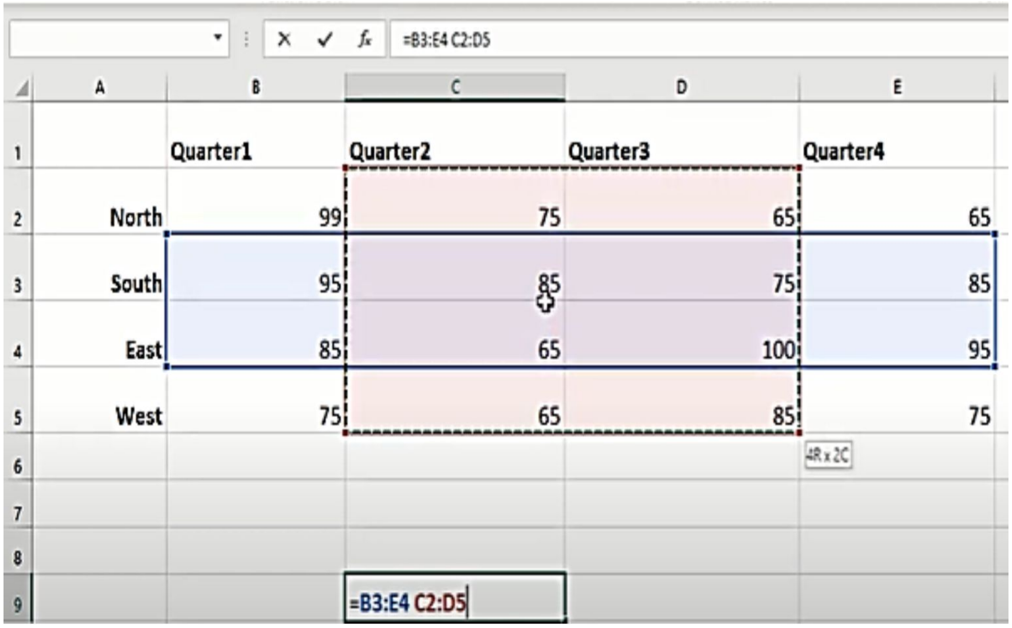
Press Enter. The formula will return the value 85 and that is the value at the intersection cell C3 of the two ranges.



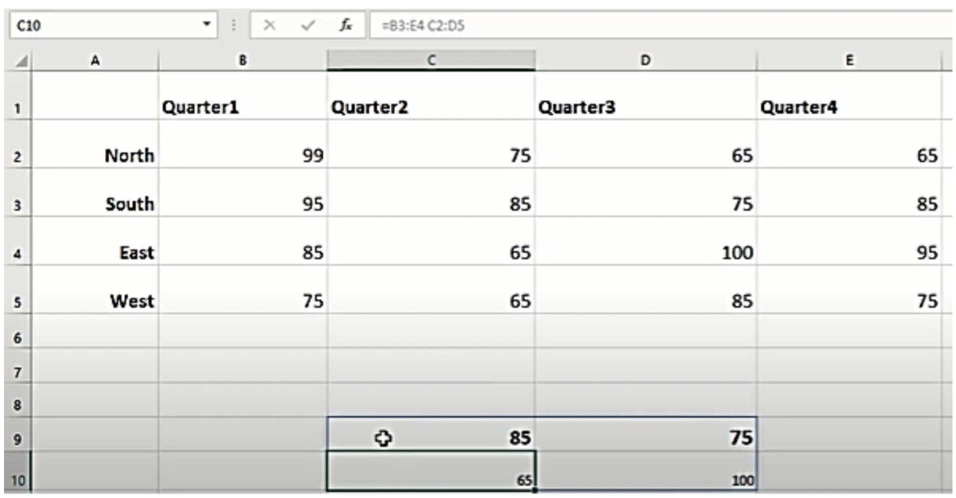
C9 =C2:C5 B3:E3

	A	B	C	D	E
1		Quarter1	Quarter2	Quarter3	Quarter4
2	North	99	75	65	65
3	South	95	85	75	85
4	East	85	65	100	95
5	West	75	65	85	75
9			85		

You can use multiple rows and multiple columns to return more than one value in more than one cell. Select cellC9 and press equal to sign. Select B3 to E4. Press the spacebar and select cell D2 to D5.



This formula will return an array of the intersection of both ranges. Press **ENTER**.



Applying names to existing references

Names may be added to existing formulae. If you use ordinary cell references in your formula and then assign Names to those cells, the formula will automatically change to utilize the Defined Names. As an example, consider the formula =B7+G7. You may pick the cell that has the formula, go to the Insert menu, Select Name, and then Apply if you subsequently give the names **CellOne** to **B7** and **CellTwo** to **G7**. Pick the relevant names from the list, or choose all of them, and then click OK. The formula will be changed to **=CellOne+CellTwo** in Excel.

WORKING WITH FORMULAS

Not hard-coding values

Hard coding is among the worksheet errors you can experience while working with formulas in Excel. Hard coding of values simply indicates that when you have a formula such as **=C2*G3**, you can add a value to it. For example, **=C2*G3 + 750**.

The value that was added which is **+750** is a hard-coded number. This value will bring up errors. So, ensure that your cells contain just data or formula. Do not mix them up.

Using the formula bar as a calculator

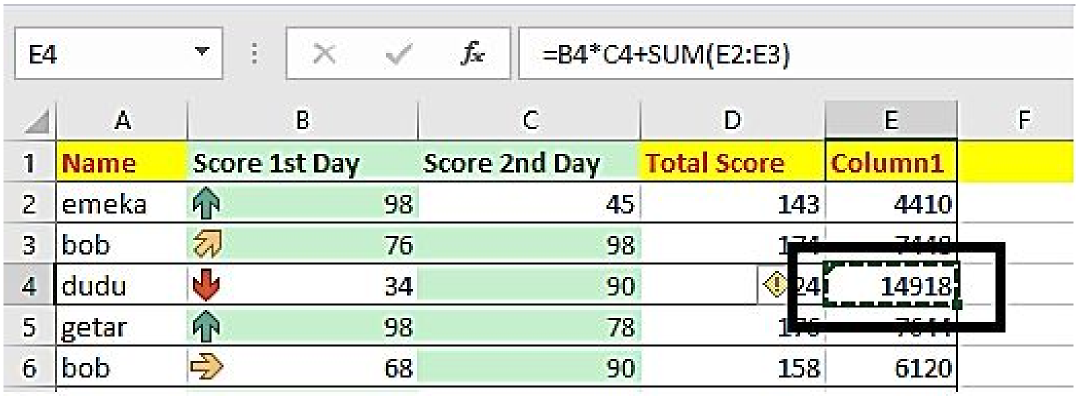
You can perform some calculations using the formula bar in Excel. The formula can serve as a calculator for you. For instance, put in the formula below and after putting it, do not press the Enter key.

= (165*3.86)/16

Let's say you press the Enter key, the answer to this equation will be displayed in the selected cell. Though the answer will be the same even if it is displayed in the formula bar. To make the answer display in the formula bar, simply press **F9**. You will see the answer in the formula bar.

Making an exact copy of a formula

Choose the cell that has the formula. Press **Control key + C** on your keyboard. You can also choose **Copy** on the Home Tab. The cell that you want to copy the formula will be highlighted. The cell will stay that way till you have pasted the formula.



Now, pick the cell for pasting the formula. Then, press Control key + V. You can right-click and choose any of the Paste options given to you.

Converting formulas to values

First of all, choose the cells with the formula for the changing of value. Press Control key + C to copy them. Then, right-click and navigate to the Paste Options and pick Values. This will convert the formulas to values.

There are shortcuts for doing this to make it easier for you. The first one is the **Shift key + F10 + V.** After highlighting the cells and copying them, press this shortcut key. The second one is the **ALT key + E + S + V.** The third one is the **ALT key + H + V + S + V**. They are following the same process but different shortcut keys.

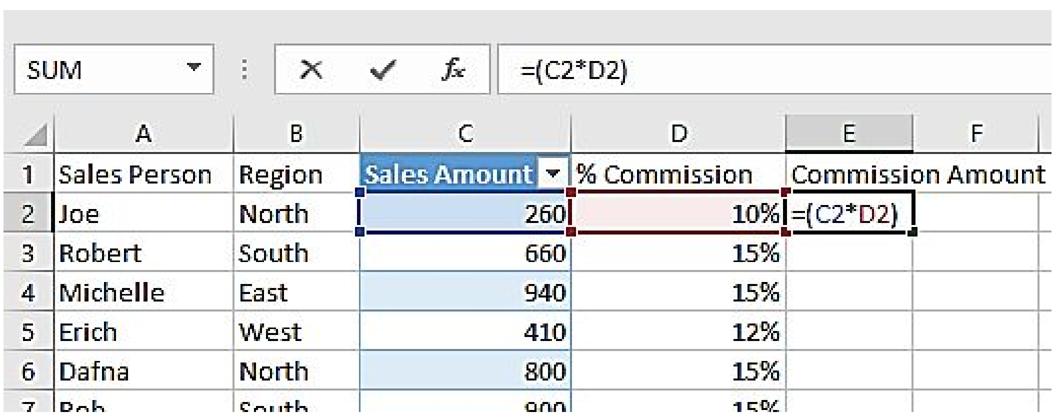
CHAPTER TWO

USING FORMULAS FOR COMMON MATHEMATICAL OPERATIONS

Calculating Percentages

Calculating percentages in Excel is an easy process and it can be done in many ways such as Formulas and Formatting. How you calculate it depends on the type of data you have. There is no particular formula for calculating the percentage. Below is how to do so;

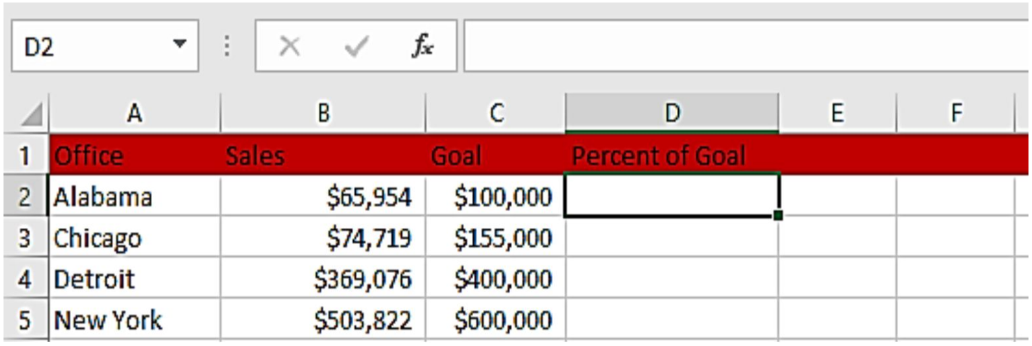
First, choose a cell and put in an **equal to sign =** and then put in an open parenthesis. Put in the name of the cell you want to calculate the percentage. Put an asterisk. Select the cell that has the percentage you want to calculate. Then, put in a close parenthesis. Then, hit **Enter**.


SUM =(C2*D2)

	A	B	C	D	E	F
1	Sales Person	Region	Sales Amount	% Commission	Commission Amount	
2	Joe	North	260	10%	=(C2*D2)	
3	Robert	South	660	15%		
4	Michelle	East	940	15%		
5	Erich	West	410	12%		
6	Dafna	North	800	15%		
7	Rob	South	900	15%		

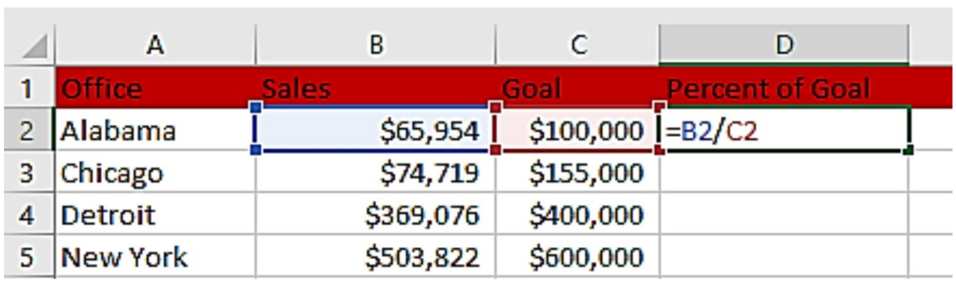
Calculating percent of goal

This is a super quick and simple Excel formula. In the image below, you have Office, some sales, and you have your goal.

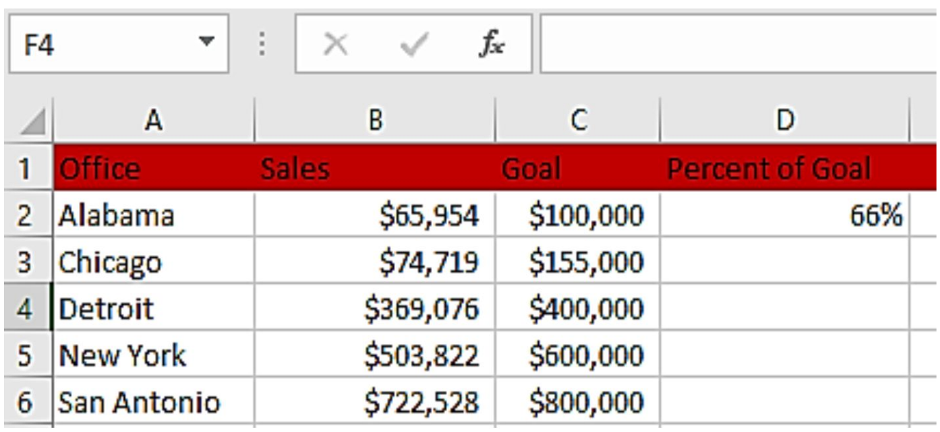


	A	B	C	D	E	F
1	Office	Sales	Goal	Percent of Goal		
2	Alabama	$65,954	$100,000			
3	Chicago	$74,719	$155,000			
4	Detroit	$369,076	$400,000			
5	New York	$503,822	$600,000			

So in the first case of Alabama, we are going to say our goal was $100,000 and our total sales were $65,954. So, we need to calculate the percentage of our goal that we reached. The formula will be our Sales over our goal which **is =B2/C2**



	A	B	C	D
1	Office	Sales	Goal	Percent of Goal
2	Alabama	$65,954	$100,000	=B2/C2
3	Chicago	$74,719	$155,000	
4	Detroit	$369,076	$400,000	
5	New York	$503,822	$600,000	



	A	B	C	D
1	Office	Sales	Goal	Percent of Goal
2	Alabama	$65,954	$100,000	66%
3	Chicago	$74,719	$155,000	
4	Detroit	$369,076	$400,000	
5	New York	$503,822	$600,000	
6	San Antonio	$722,528	$800,000	

You will get 66%. Always make sure that you are highlighting your column at least before pressing the percentage icon, otherwise, it is going to come out as a decimal, and obviously, we want it to be displayed in terms of percentage. So, use the fill handle to fill in the other cells with their respective percentage goal.

D2 | =B2/C2

	A	B	C	D	E	F
1	Office	Sales	Goal	Percent of Goal		
2	Alabama	$65,954	$100,000	66%		
3	Chicago	$74,719	$155,000	48%		
4	Detroit	$369,076	$400,000	92%		
5	New York	$503,822	$600,000	84%		
6	San Antonio	$722,528	$800,000	90%		
7	Texas	$1,125,154	$1,200,000	94%		

Calculating percent variance

Percentage variance is the change or difference between two variables. it can be a difference between the sales you made last year and the sales you made this year. It displays how things have changed over some time. Calculating percent variance can be done with two formulas which are; **(new value – old value) / (old value)** and **new value / old value – 1**.

For example, you have an estimated sale and an actual sale. Now, let's find the percent variance. Using the image below, the formula will be **=(C2-B2)/B2 or =C2/B2-1**. Then, press Enter. You will get the result. Both formulas give you the same answer. You can use the fill handle to fill in the percent variance for other cells.

	A	B	C	D	E	F
1	Month	Estimated	Actual	Variance		
2	Jan	$160	$120	-25.00%	-25.00%	
3	Feb	$130	$150	15.38%	15.38%	
4	Mar	$90	$125	38.89%	38.89%	
5	Apr	$170	$140	-17.65%	-17.65%	
6	May	$0	$0	0.00%	0.00%	
7	June	$150	$150	0.00%	0.00%	

As you can see in the image, the numbers are in decimals. You can modify it by clicking the percentage icon in the Number group on the tab or you right-click and format the cells as a percentage.

Month	Estimated	Actual	Variance	
Jan	$160	$120	-25%	-25%
Feb	$130	$150	15%	15%
Mar	$90	$125	39%	39%
Apr	$170	$140	-18%	-18%
May	$0	$0	0%	0%
June	$150	$150	0%	0%

Calculating percent variance with negative values

Most times, you may have a negative value in your work and you want to calculate the percent variance of those values. The formula used above will not do that for you. You have to use the ABS formula which is **(new value – old value) / ABS (old value).**

So, now we have negative values as you can see below. The formula for this will be **=(C2-B2) / ABS (B2).**

D2 =(C2-B2)/ABS(B2)

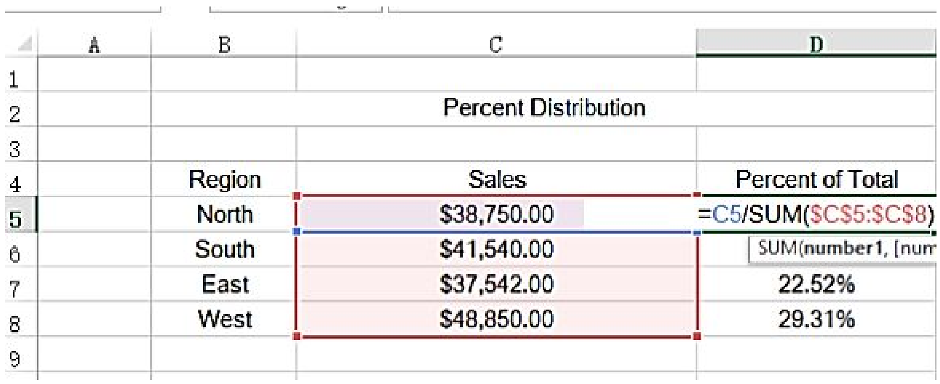
Month	Estimated	Actual	Variance
Jan	-$160	-$120	25.00%
Feb	-$130	-$120	7.69%
Mar	-$90	$20	122.22%
Apr	$170	$140	-17.65%
May	-$30	-$40	-33.33%
June	-$150	-$150	0.00%

This formula gives the correct answer but is likely to bring out some misleading results. This may occur when the main value is positive while the new value is negative.

Calculating a percent distribution

A percent distribution explains how something is distributed within the different parts that make up something. Calculating this is an easy process.

Simply divide each of the parts by the total part. The cell reference to the total is absolute.

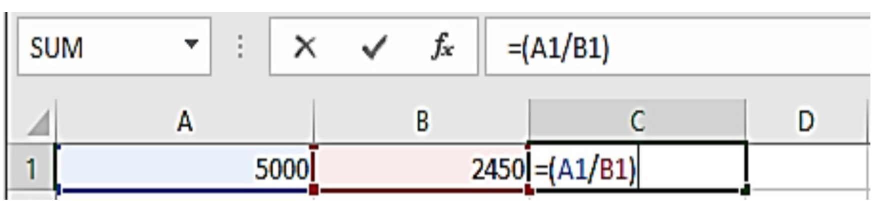


Calculating a running total

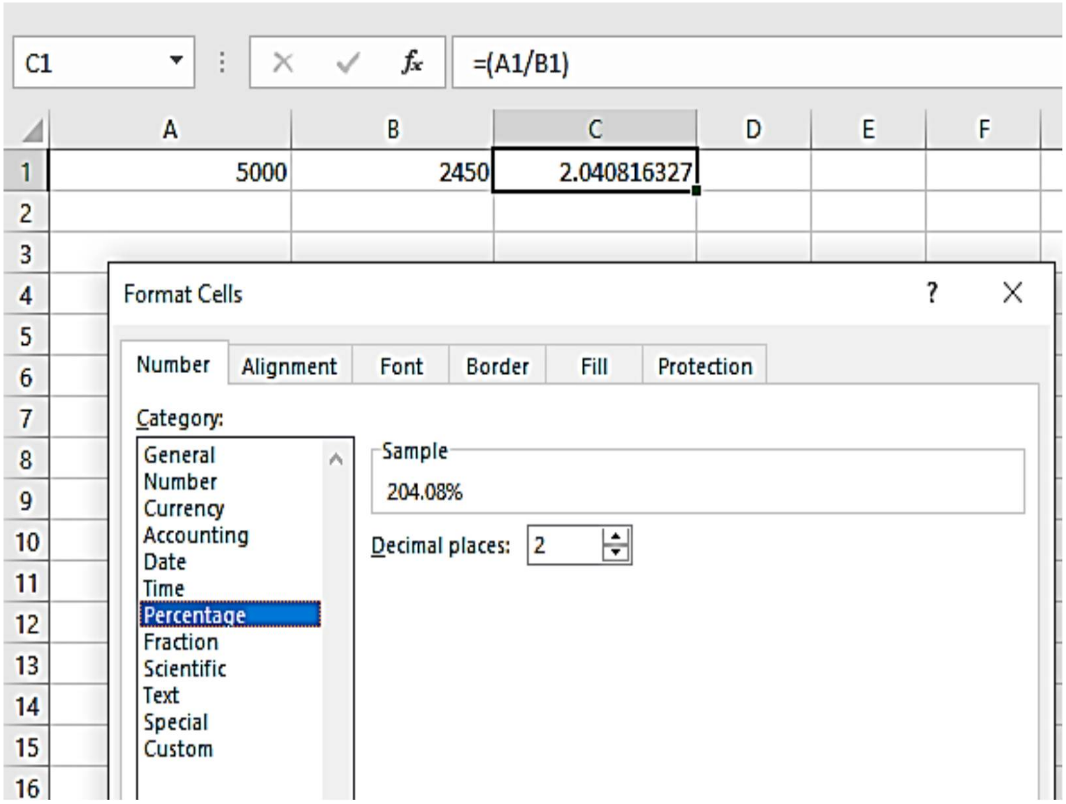
Assuming you want to save about 5000 dollars and all you have now is 2450 dollars in your account. You can decide to find out the percentage of the amount you have saved. You can do this with Excel.

1. First, enter the total amount to want to save up in a cell and enter in the amount you have in another cell.

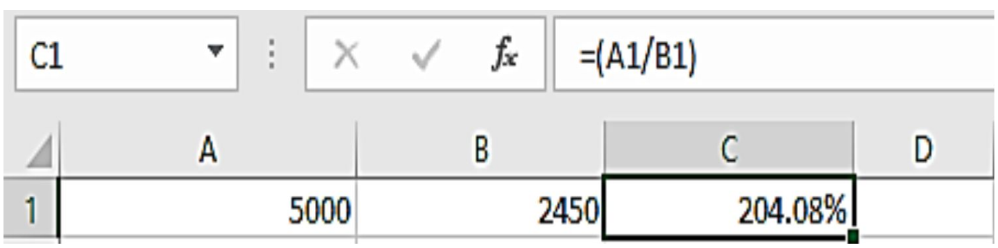
2. On another cell, put in an equal sign followed by the cell address of the total amount. Then, put in a **slash** / and enter in the cell address of the amount you have now followed by a closing parenthesis.



3. Then press Enter. You will see an answer displayed on the cell. Simply, right-click, then pick Format Cell. Choose **Percentage**. You can modify the decimals places if you wish to. Select OK.



You will get the percentage.



Applying a percent variance with negative values

This can be done with the IF function and MIN function.

=IF(MIN(old value, new value)<=0,"--",(new value/old value)-1)

The following is how it works:

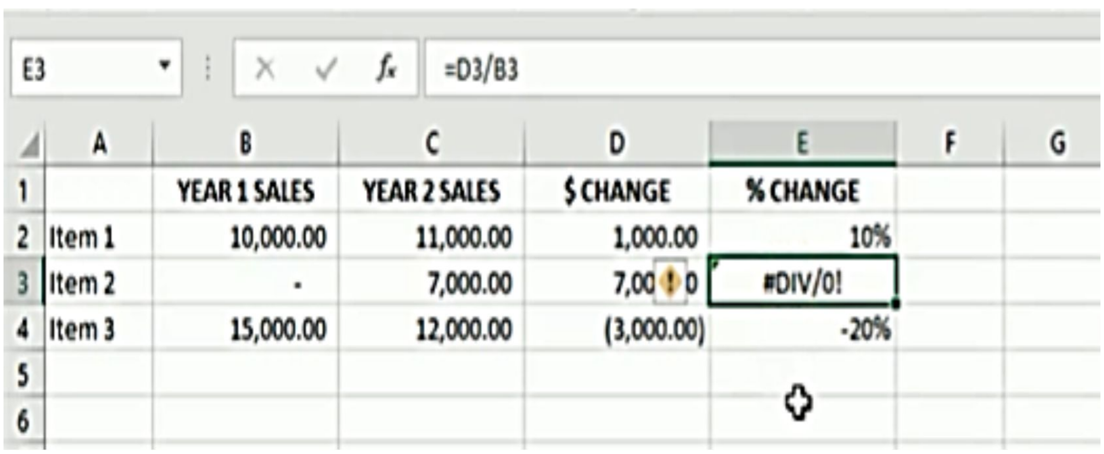
The IF function's logical test (MIN (old value, new value) =0) determines the minimum of the two numbers and checks if it is below or close to 0. TRUE or FALSE will be the outcome.

When the answer is TRUE, it means that there is a negative number (or zero). We may show some text in this scenario to inform the reader. This might be whatever you want it to be. I just used two "–" dashes. You may alternatively use the **NA ()** method to return a N/A error or any text that informs the reader that the percentage change could not be computed.

When the result is FALSE, the percent difference method is used to bring back two positive integers to calculate the % change.

Dealing with divide-by-zero errors

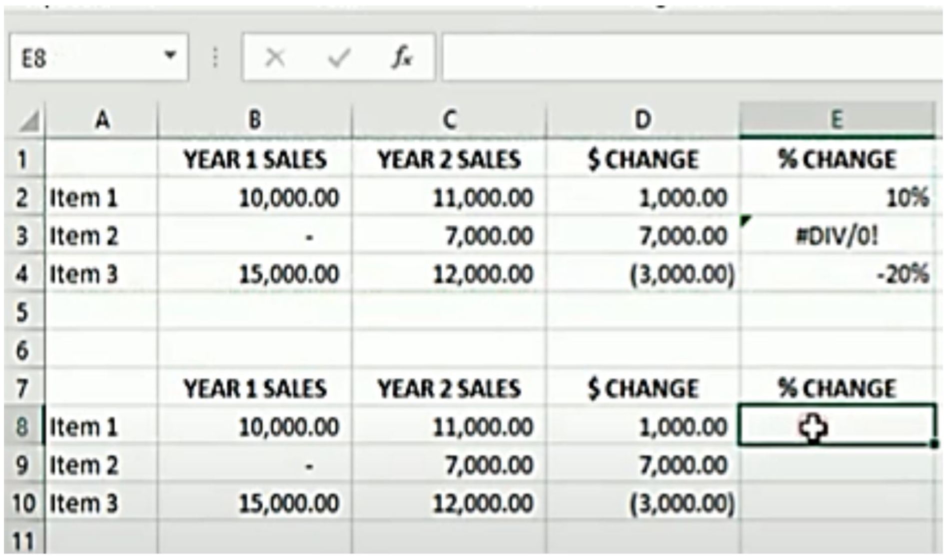
The IF function is a great function to use when dealing with divide-by-zero errors in Excel. There are other functions that you can use to perform the same action. Here, we have got just the simple table that we have which consists of Year one sales, Year two sales and we have calculated the dollar change and the percent change. But for one of these items, since there were no sales in year 1, we inherently have it divided by zero error.No no way we can avoid that.



E3 =D3/B3

	A	B	C	D	E	F	G
1		YEAR 1 SALES	YEAR 2 SALES	$ CHANGE	% CHANGE		
2	Item 1	10,000.00	11,000.00	1,000.00	10%		
3	Item 2	-	7,000.00	7,000.00	#DIV/0!		
4	Item 3	15,000.00	12,000.00	(3,000.00)	-20%		
5							
6							

So, no one wants to see an error message locked out on the report. So we need to find some way to deal with it. So, we will make a different formula for our percentage change. Instead of dividing D8 BY D8, let’s just take out the values in the percentage cells.



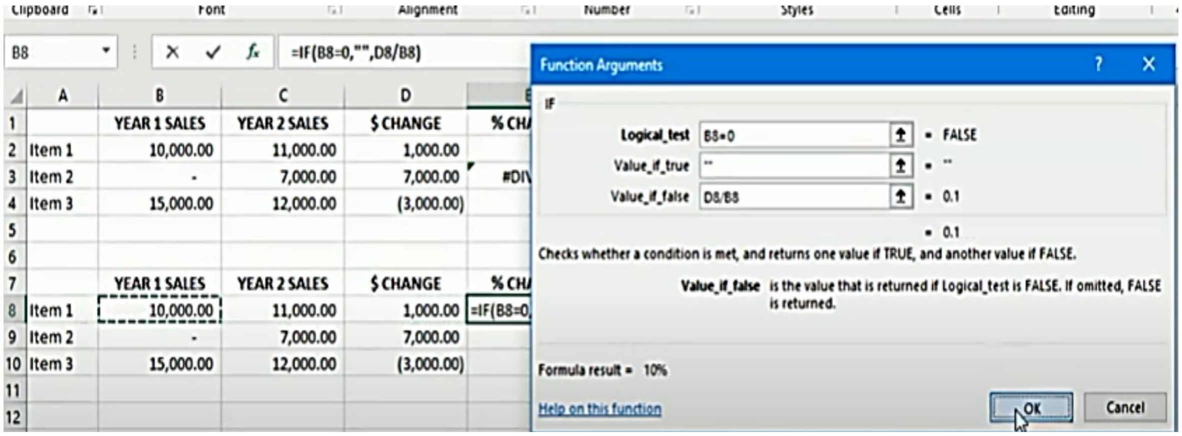
E8

	A	B	C	D	E
1		YEAR 1 SALES	YEAR 2 SALES	$ CHANGE	% CHANGE
2	Item 1	10,000.00	11,000.00	1,000.00	10%
3	Item 2	-	7,000.00	7,000.00	#DIV/0!
4	Item 3	15,000.00	12,000.00	(3,000.00)	-20%
5					
6					
7		YEAR 1 SALES	YEAR 2 SALES	$ CHANGE	% CHANGE
8	Item 1	10,000.00	11,000.00	1,000.00	
9	Item 2	-	7,000.00	7,000.00	
10	Item 3	15,000.00	12,000.00	(3,000.00)	
11					

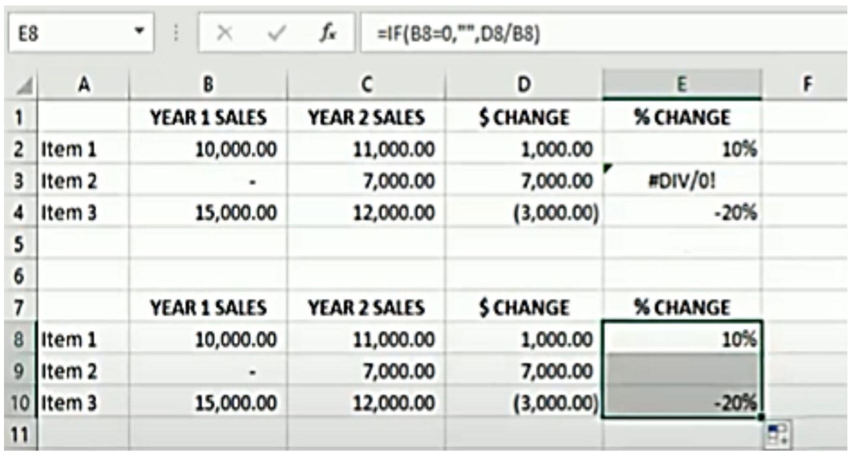
Then, using the Function Wizard, we will make a formula for it. So, type in this =IF(, then press the FX icon to open the Function Argument. The first option is our Logical text and that is going to be cell B8=0. The second option is the Value if true which is where you decide what you want to display. A lot of times, I will just put in two quotations (‘’) marks so that I will get nothing in there.

If you want the text, the text has to be always in quotation marks. That is the two quotation marks if you want nothing and maybe you would want to say NEW product and therefore we cannot calculate a percentage change or if you wanted to show 0 as a percentage change on those products. I will let you argue with the match nerds about whether or not it should show zero. but whatever you want to put in there that’s going to be the value if true.

The value of false is our original formula and that will be the dollar change divided by last year's sales. Press OK.



Then, when you use the fill handle to fill the other cells in, you will see we no longer have the Divide by Zero Error.

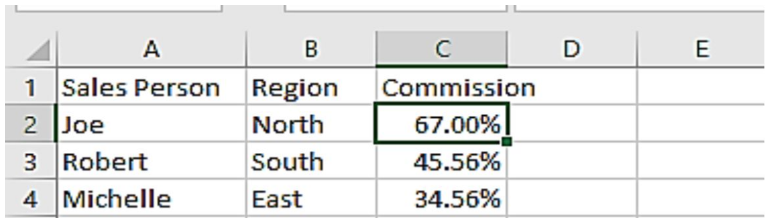


ROUNDING NUMBERS

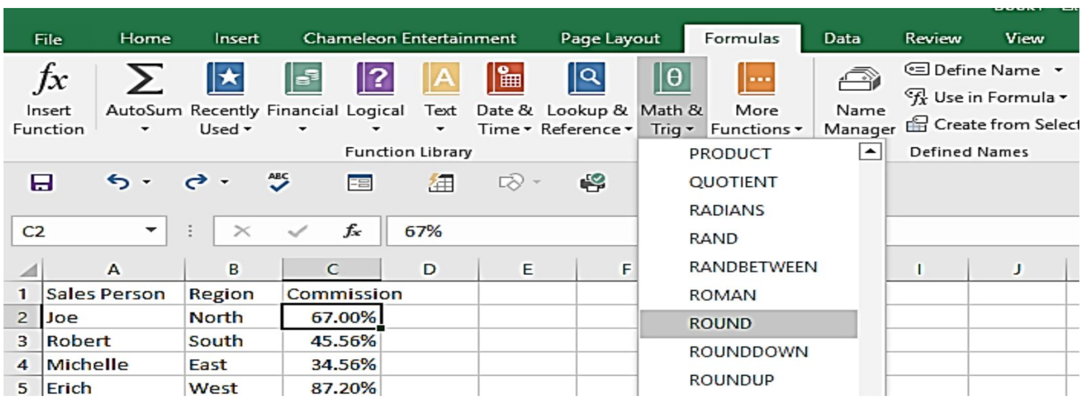
Rounding off numbers can be done with the use of the **Round** function. There are two arguments for the Round function which are the Number and the Number digits. The number consists of the number that is to be rounded up while the number digits are the number of digits which the number is to be rounded. The function is located in the Formula tab.

Rounding numbers using formulas

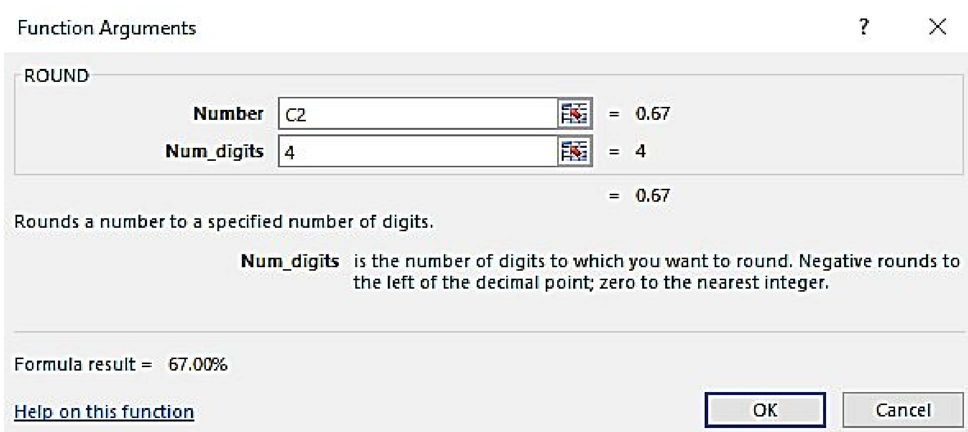
In the image below, you are to round up the percentages. So first select the cell.



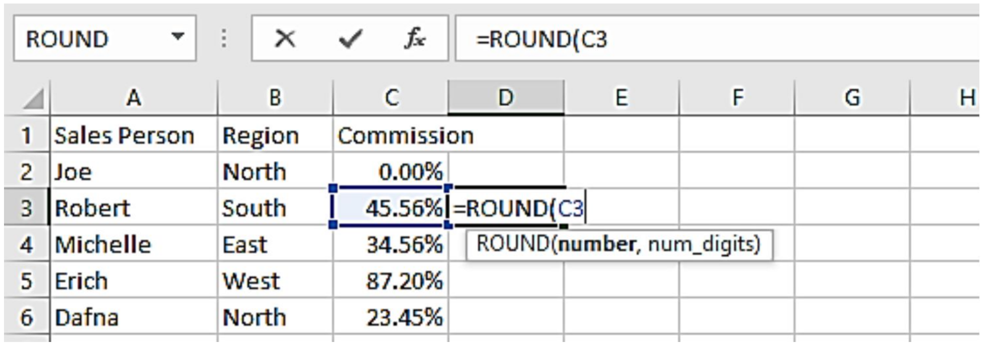
Then click the Formula tab, Math & Trig, and then ROUND.



Then, on the Function Argument dialog box, enter in the Number and the Number Digits. You can click on the cell to select the number. Choose OK.



You can use the =Round function to do the same thing as well.



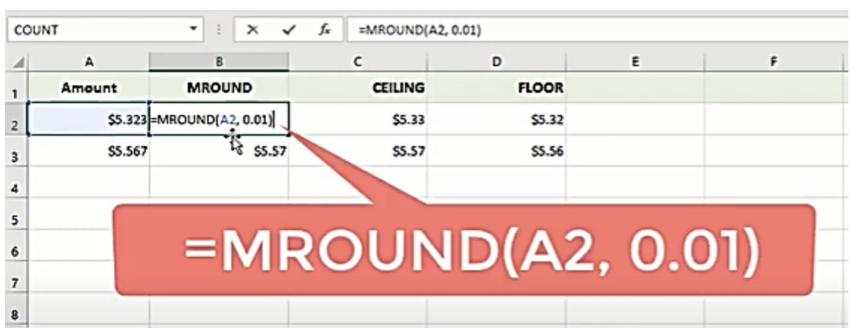
ROUND | =ROUND(C3

	A	B	C	D
1	Sales Person	Region	Commission	
2	Joe	North	0.00%	
3	Robert	South	45.56%	=ROUND(C3
4	Michelle	East	34.56%	ROUND(**number**, num_digits)
5	Erich	West	87.20%	
6	Dafna	North	23.45%	

Rounding to the nearest penny

You can round to the nearest penny by using the MROUND, CEILING, or, FLOOR function. MROUND function rounds a number to the nearest multiple that you pass to it.

So, to round up the amount in cell A1 to the nearest penny, simply use MROUND with a multiple of 0.001. Your formula should be this way **=MROUND(A2, 0.01)**.



COUNT | =MROUND(A2, 0.01)

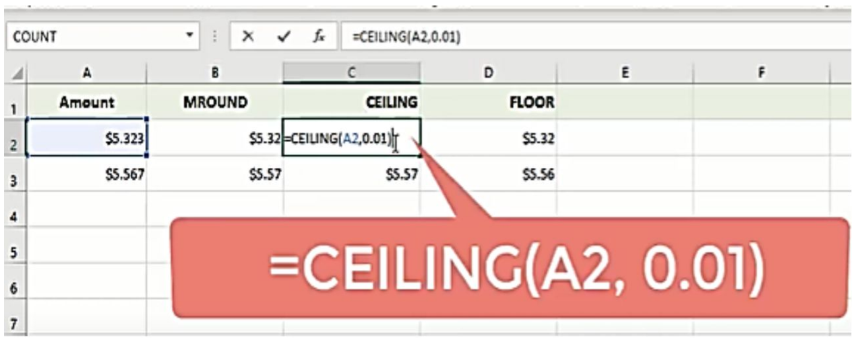
	A	B	C	D
1	Amount	MROUND	CEILING	FLOOR
2	$5.323	=MROUND(A2, 0.01)	$5.33	$5.32
3	$5.567	$5.57	$5.57	$5.56

Then, hit ENTER. You will see the 5.323 rounded up to 5.32. Use the fill handle to fill in other cells.

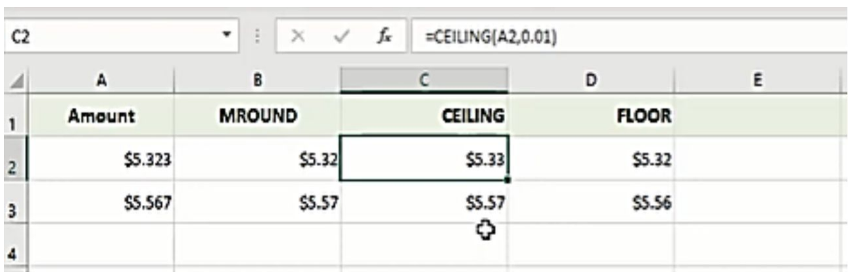
B2 | =MROUND(A2, 0.01)

	A	B	C	D
1	Amount	MROUND	CEILING	FLOOR
2	$5.323	$5.32	$5.33	$5.32
3	$5.567	$5.57	$5.57	$5.56

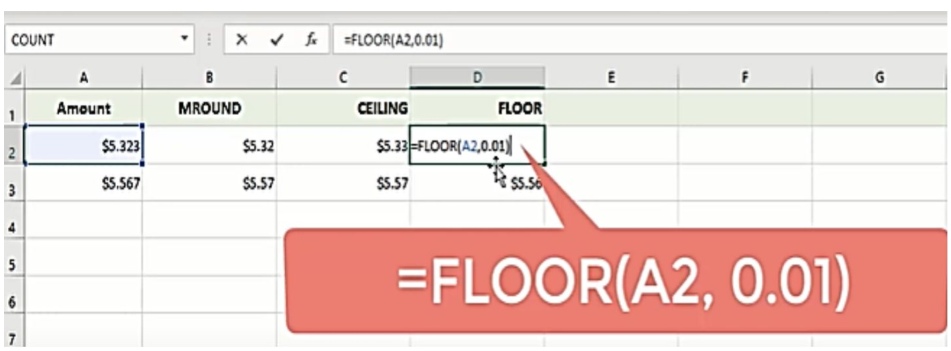
The CEILING function will round a number up to the nearest multiple of significance that you pass to it. So, passing a 0.01 as the sign tells the CEILING function to round up to the nearest penny.



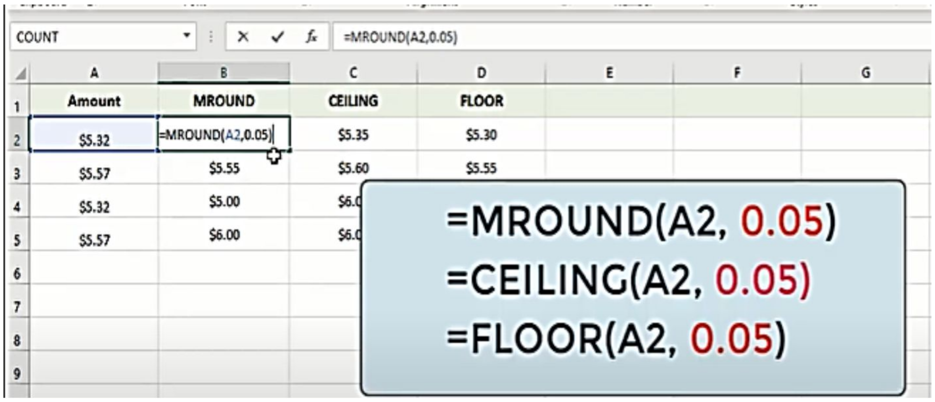
5.323 is rounded to 5.33 and 5.567 is rounded to 5.57.



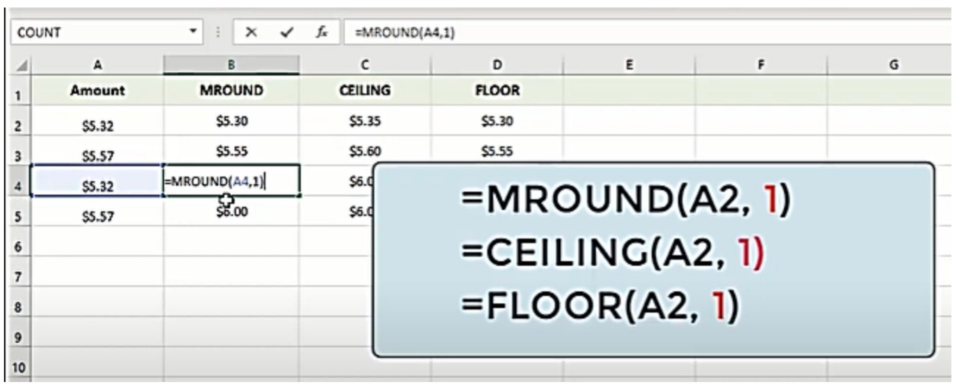
The FLOOR function works the same way except it forces rounding down to the nearest significance. So, passing a 0.01 as the sign tells the FLOOR function to round down to the nearest penny.



5.323 is rounded to 5.32 and 5.567 is rounded to 5.56. If you want to round to the nearest nickel, use 0.05 as the multiple. For example, MROUNDS rounds 5.32 to 5.3, CEILING rounds to 5.53, and FLOOR rounds to 5.3.



If you want to round to the nearest dollar, use 1 as the multiple. For example, MROUND rounds 5.32 to 5, CEILING rounds to 6, and FLOOR rounds to 5.



Rounding to significant digits

Significant numbers are digits that add to the correctness of a number, in a scenario if you didn't know or didn't recall. The functions ROUND, ROUNDUP, and ROUNDDOWN may be used in these situations since they include rounding techniques for positive, negatives, full, and fractional values.

However, there are a few guidelines that you should follow:

A negative number is first transformed to its actual values before being rounded (its value without the negative sign). The negative sign is then reintroduced after the rounding step. Although it may seem illogical, this is how rounding works.

When the ROUNDDOWN function is used to round -779 to two significant digits, the output is -770. To begin, we convert -779 to its absolute value of

779. The result is then rounded down to two significant numbers (770). Finally, the negative sign is repeated, yielding a -770 result

When you use the ROUNDDOWN function on a positive number, it still rounds it down, and when you use the ROUNDUP function, it always rounds it up.

The ROUND function rounds a fractional value in the following way: The number is rounded up if the fractional portion is 0.5 or more. The number is rounded down if the fractional portion is less than 0.5.

The ROUND function rounds a whole integer up or down in the same way as fractional numbers are rounded up or down, replacing multiples of 5 for 0.5.

When rounding a number that has no fractional portion (a whole number), you subtract the length from the number of significant digits you wish to round to.

To round 2345678 to three significant digits, for example, use the ROUNDDOWN function with the argument -4, as shown below: = round numbers in Excel. The result is 2340000, with the "234" component serving as the significant digits.

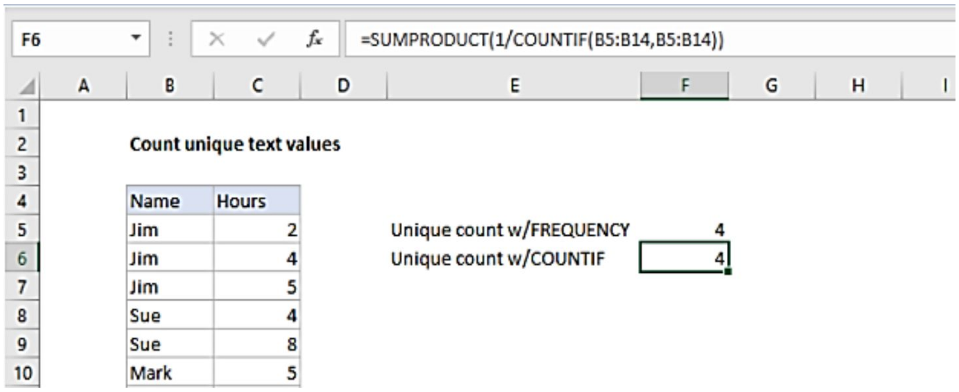
COUNTING VALUES IN A RANGE

You count the number of values that match a certain range. Counting values in a range are done with the use of the SUMPRODUCT and COUNTIFS functions. It counts how many cells match one or more conditions/requirements. The COUNTIFS function uses this formula **=COUNTIFS(criteria_range1, criteria1, [criteria_range2, criteria2]…)**

Explanation:

- Criteria_range 1 is the data range that will be calculated with the use of criteria1.
- Criteria1 is the condition that defines which cells are to be counted.
- Criteria_2 & Criteria2 are voluntary; they are applied when there is an existence of over one criterion.

In the image below, the formula in F6 is **=SUMPRODUCT(1/COUNTIF(B5:B14, B5:B14))**



Explanation:

COUNTIF is used from B5:B15 which uses the same values as criteria **COUNTIF(B5:B14, B5:B14).** We have ten values for criteria, so we are to bring back an array that has ten results such as **{3;3;3;2;2;3;3;3;2;2}.** These numbers signify counts. For instance, Jim displayed three times, Mark displayed three times, etc.

The array will be configured as a divisor. The number 1 will be the numerator. When you are done dividing, you will have another array as seen below;

{0.333333333333333;0.333333333333333;0.333333333333333;0.5;0.5;0.333333333333333;0.333333333333333;0.333333333333333;0.5;0.5}

Every value that is displayed once in that range will be displayed as 1s while values that are displayed more than once will be displayed as fractional values.

USING EXCEL'S CONVERSION FUNCTIONS.

The Excel conversion function is used to convert numbers in a measurement system to another system such as gallons into liters, pounds into kilograms, and so on. For instance, the formulas you see below make use of the Convert function. Here, it converts yards to meters, gallons to liters, Celsius to Fahrenheit, and square meters to square yards,

```
=CONVERT(100,"yd","m")        //
```

returns 91.44
=CONVERT(22,"C","F") // returns 71.6
=CONVERT(1,"gal","l") // returns 3.79
=CONVERT(100,"m2","ft2") // returns 1076.39

There are things you need to note down when working with the conversion function. It is case-sensitive. If a unit string is not found or recognized, it will display a **#N/A error**. If the units are not well-matched, it will display the **#N/A error**. Also, it will display the error if the number is not valid.

This function has the following arguments:

1. The number which you are to convert (**Number**)
2. The unit in which the number you want to convert is in (**From Unit**)
3. The unit in which you want to convert the number into (**To Unit**)

CHAPTER THREE

USING FORMULAS TO MANIPULATE TEXT

WORKING WITH TEXT

When you work on Excel, you go on with numbers, text, calculations, formulas, and so on. Almost everything done in Excel is done with Text. There are different functions and formulas used in Excel when working with text. The text splitting function helps you disperse words from a particular cell to another.

There are tips you need to know while working with text. Some of the tips are listed below;

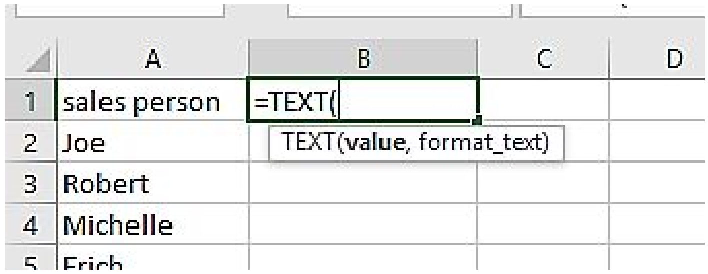
Changing Text Case: You must know when the text you work with should be uppercase, lowercase, or proper case. Some of the text functions are case-sensitive. So, when you don’t put in the correct case, the function will not work properly.

Imagining "Beyond the Cell'': I often observe Excel users retyping or manipulating data inside a cell to get the desired format and appearance. To borrow an overused cliché, you'll frequently work “outside of the cell" when transforming text, which means adding additional columns to contain the formula to display the results. You may have some version of the data, don't retype it; instead, use any of the text functions below to construct what you need such as the Paste Values option to copy and paste the results into the cell or another column after you have the results.

Cleaning up Data: Having too much text and spaces on your worksheet is not proper. You can use the TRIM or CLEAN function to clear out strange characters and extra spaces in your worksheet.

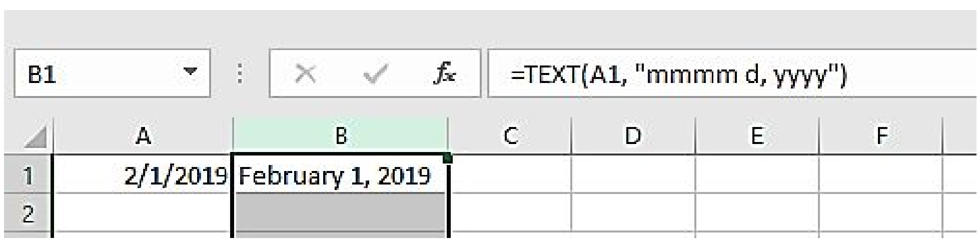
Using Text Function

You make use of the Text Function to change values into text. Even after changing the value to text, you can still format the value to your desired format. Most times, people use it to change numeric values to text, though it can be used to change any value at all into text. The formula is



The value means the number that is to be changed to text. It might be a number, date, cell reference, etc. while the Format_text is the format you want to use. So, the formula is an easy process. However, there are some tricky parts to it. That is the ability of it to give you a code that will bring out the number in a format of your choice. Though, the function agrees with most if not all the format codes used in Excel number formats.

For example, you want to convert a date like 2/1/2019 to February 1, 2019, simply select the cell for the input and put in this format code **=TEXT(A1, “mmmm d, yyyy”)**



Joining text strings

There is an Excel function that is used to join two or more text strings and that function is the CONCATENATE function. There are two ways to go about and use this function. Hers, what I have is the first name mentioned in column D and the last name of the dimension mentioned in column D. The idea is to give the full name by joining the text in column D and column E by giving in a space in-between and that will result in the full name of the individual.

S. No	Student Roll No.	First Name	Last Name	Full Name
1	117908	Chandan	Gupta	
2	141621	Deepak	Singh	
3	145640	Ankit	Sharma	
4	155907	Kiran	Singh	
5	160088	Shweta	Aggarwal	
6	160848	Karan	Malhotra	
7	168339	Parag	Sharma	
8	171891	Shishir	Gulati	
9	178397	Deepti	Goyal	
10	181571	Ashish	Sharma	

So, to do this, write the equal sign, followed by the CONCATENATE function, then select the first cell and press comma. Now, I need to give a space, though the space will be treated as a text in the formula and hence I will give the space within quotes. So, press the open quotes, give a space, put in another quote, put in a comma, and enter the second text string poster. Then, close the parenthesis. **=CONCATENATE (D4, “ “, E4)**.

S. No	Student Roll No.	First Name	Last Name	Full Name
1	117908	Chandan	Gupta	=CONCATENATE(D4, " ", E4)
2	141621	Deepak	Singh	
3	145640	Ankit	Sharma	
4	155907	Kiran	Singh	
5	160088	Shweta	Aggarwal	
6	160848	Karan	Malhotra	
7	168339	Parag	Sharma	
8	171891	Shishir	Gulati	
9	178397	Deepti	Goyal	
10	181571	Ashish	Sharma	

Press Enter. The first name and the last name will be joined together in the full name column.

S. No	Student Roll No.	First Name	Last Name	Full Name
1	117908	Chandan	Gupta	Chandan Gupta
2	141621	Deepak	Singh	
3	145640	Ankit	Sharma	
4	155907	Kiran	Singh	
5	160088	Shweta	Aggarwal	
6	160848	Karan	Malhotra	
7	168339	Parag	Sharma	
8	171891	Shishir	Gulati	
9	178397	Deepti	Goyal	

Use the fill handle to fill in other cells.

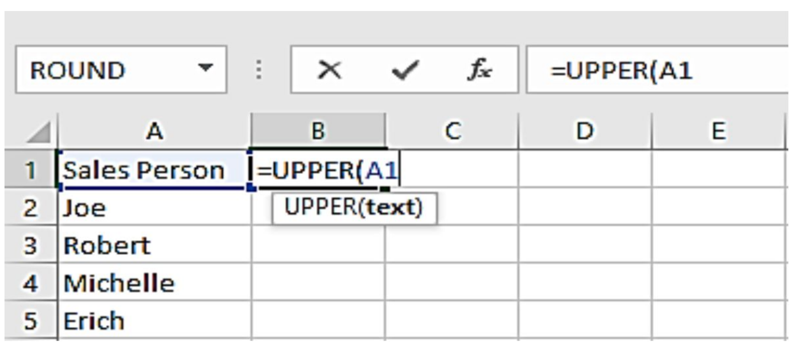
S. No	Student Roll No.	First Name	Last Name	Full Name
1	117908	Chandan	Gupta	Chandan Gupta
2	141621	Deepak	Singh	Deepak Singh
3	145640	Ankit	Sharma	Ankit Sharma
4	155907	Kiran	Singh	Kiran Singh
5	160088	Shweta	Aggarwal	Shweta Aggarwal
6	160848	Karan	Malhotra	Karan Malhotra
7	168339	Parag	Sharma	Parag Sharma
8	171891	Shishir	Gulati	Shishir Gulati
9	178397	Deepti	Goyal	Deepti Goyal
10	181571	Ashish	Sharma	Ashish Sharma
11	187539	Vinita	Malik	Vinita Malik
12	189776	Angadveer	Gupta	Angadveer Gupta
13	198686	Neha	Kaul	Neha Kaul
14	200348	Sia	Singh	Sia Singh

Settings text to sentence case

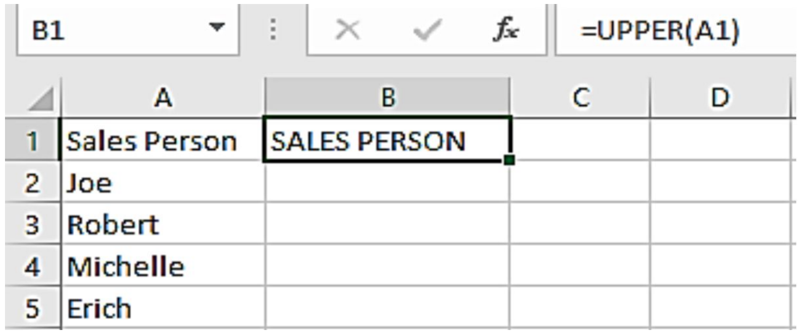
In Excel, you have three functions that change the text to sentence case. They are the UPPER, LOWER, and PROPER functions.

- **UPPER ():** This changes the text to uppercase.
- **LOWER ():** This changes the text to lowercase.
- **PROPER():** This changes the text from the improper case (which is the mixed form) to the rightful cause. The beginning letter of the word is changed to uppercase while the rest are in lowercase.

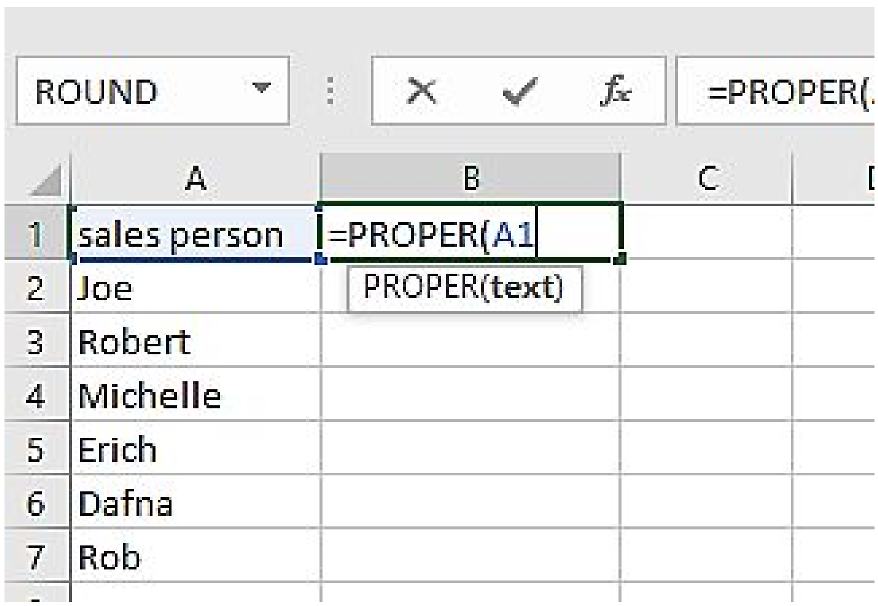
For example, let's use the upper function. Using the image below, I would like to change the values in cell A1 to the upper case. So, I insert the UPPER function followed by the cell. Then, I hit Enter.

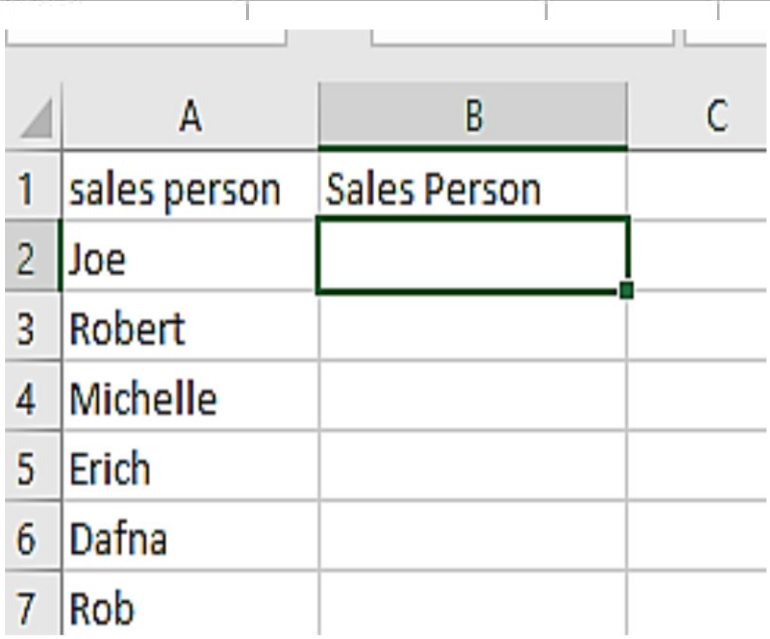


It will change to uppercase. If you would like to change all the values in your work to uppercase, simply use the fill handle and drag it down.



The same process goes with the **LOWER** function and the PROPER function.



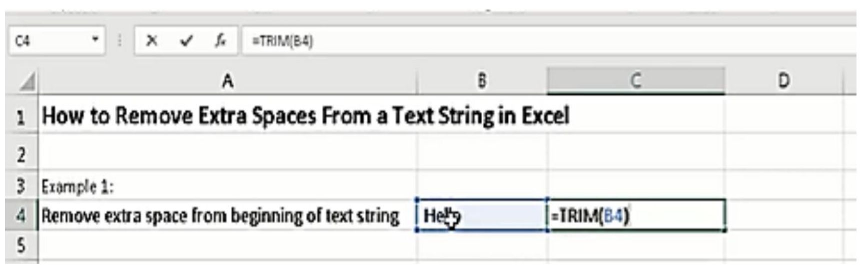


Removing spaces from a text string

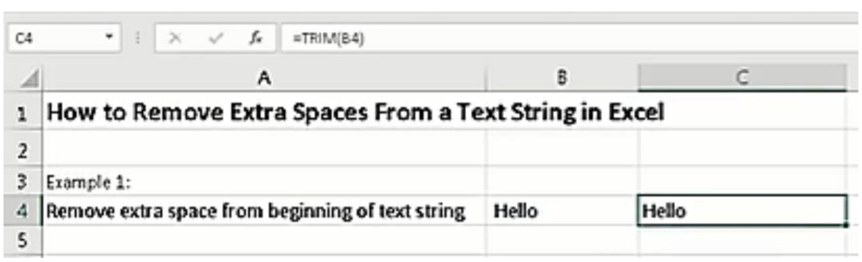
While working with Excel, it is likely that at some point, you will see data that has extra spaces. Extra spaces can cause issues with charts, formulas, and printing. These extra spaces can occur at the beginning and the end of the text. They can also occur between text strings.

The good news is that Excel has a function named TRIM that helps remove extra spaces. The first example we will look at is removing extra space from the beginning of a text string. In Cell B4, we have the texturing Hello. As you can see in the image below, there is an extra space at the beginning of the string.

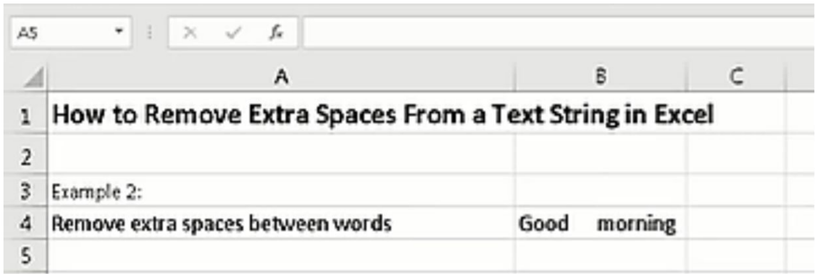
So, let's go to cell C4 to fix this. We will specify a formula with an equal sign followed by the TRIM function and then opening parenthesis. Put in the cell and add a closing parenthesis. =TRIM(B4).



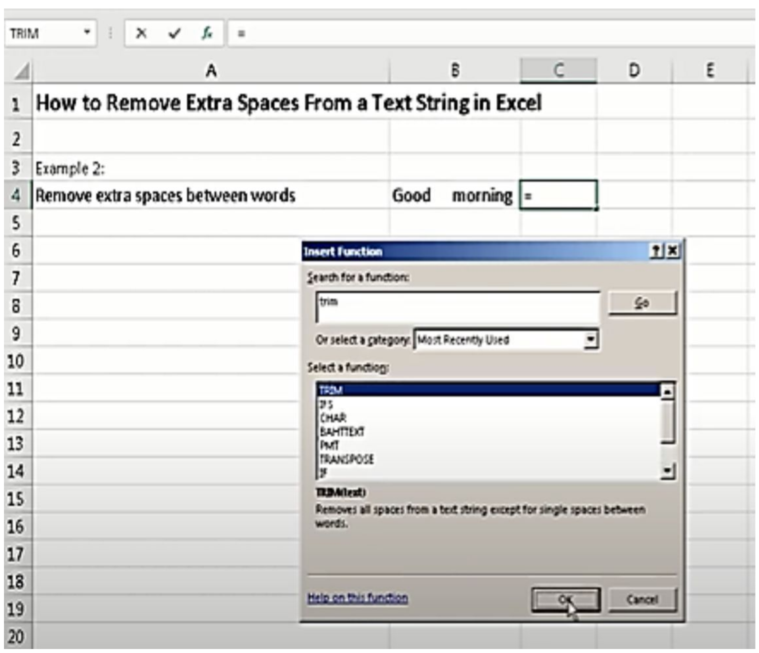
Press ENTER. Now, you can see that the Hello text no longer has an extra space in front of it.



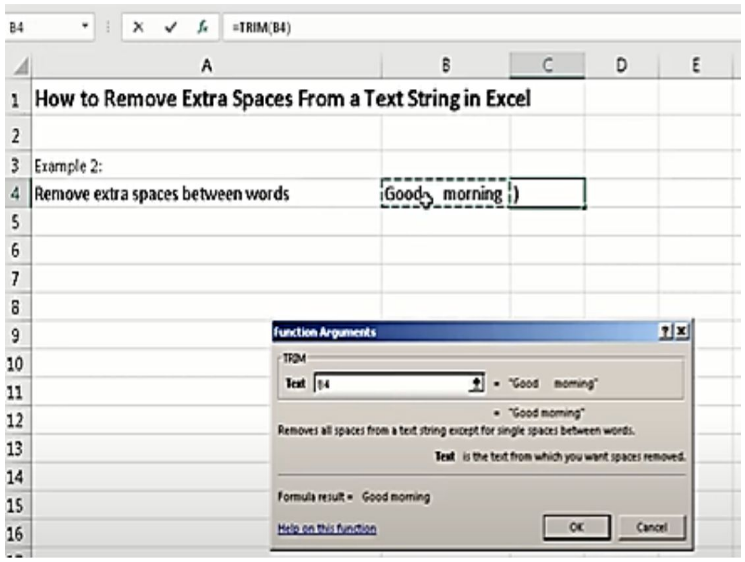
In the next example, we will remove extra spaces between two words. As you can see in cell B4, we have the text string **GOOD MORNING** and it is quite obvious that we have extra spaces in between the words.



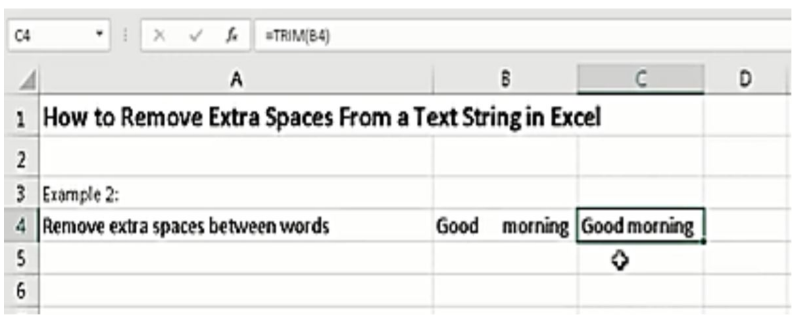
Now, let’s go to cell C4 to fix the issue. We will try a slightly different method. Last time we wrote in the formula using the formula, now we will use the INSERT function command. Click on the FX icon close to the Formula tab and then search for the TRIM function. As you can see in the image, it says TRIM removes all spaces from a text string except for single spaces between words.



So, go ahead and click OK and you will need to specify the text. Click on the Good Morning cell to specify it.



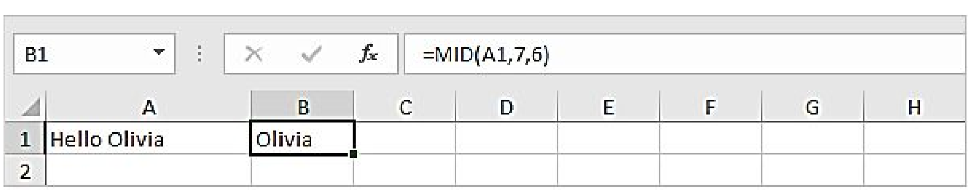
Click OK. As you can see, the good morning now does not contain the extra spaces between the two words.



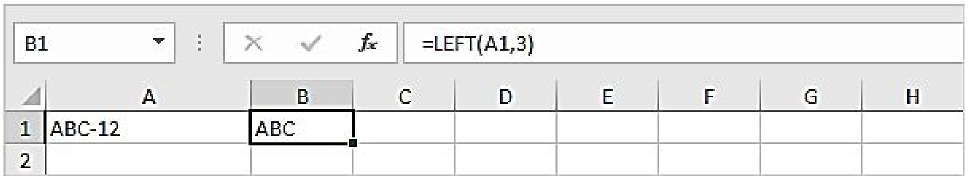
Extracting parts of a text string

Depending on the part of the text string you want to extract. Functions like MID, RIGHT, LEFT, FIND, LEN, SUBSTITUTE, REPT, MAX, and TRIM to do so. Let me give you an explanation of them and how they work.

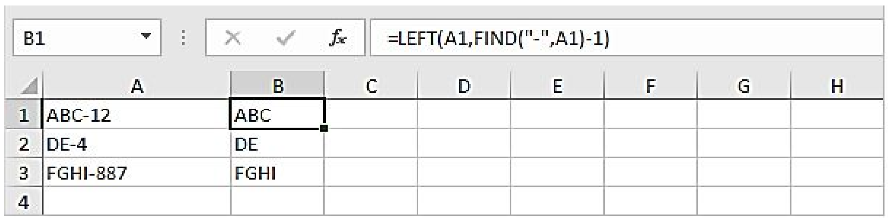
MID: This is used to extract a part of a string from the middle of that string. It extracts six characters and begins at a position 7 (O)



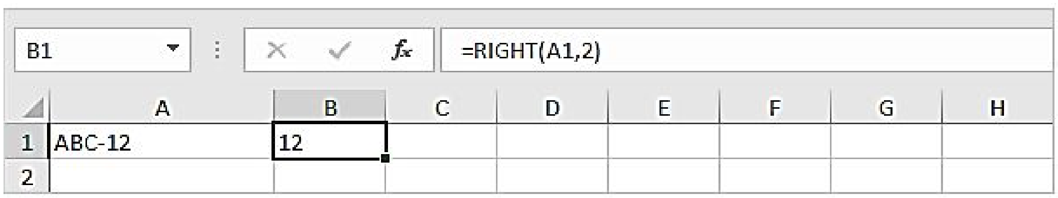
LEFT: This is used to extract a part of a string from the left.



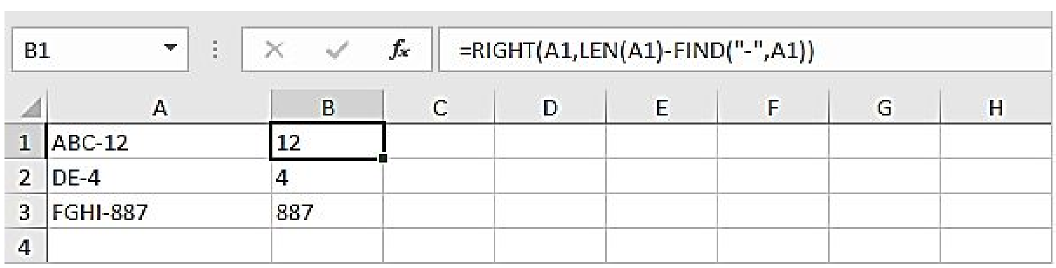
FIND: This is for extracting a part of a string of any length before the dash. It discovers the position of the dash. Minus one from the result to extract the right values for the left characters.



Right: For extracting the right part of a string.



If you want to extract the parts after the dash, you will have to include the LEN and FIND functions.

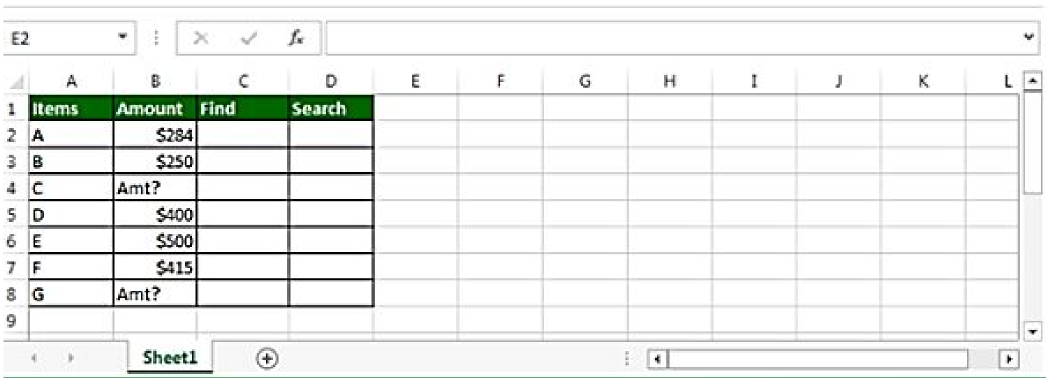


The function of LEN is to bring out the length of the string while the function of FIND is to discover the dash position.

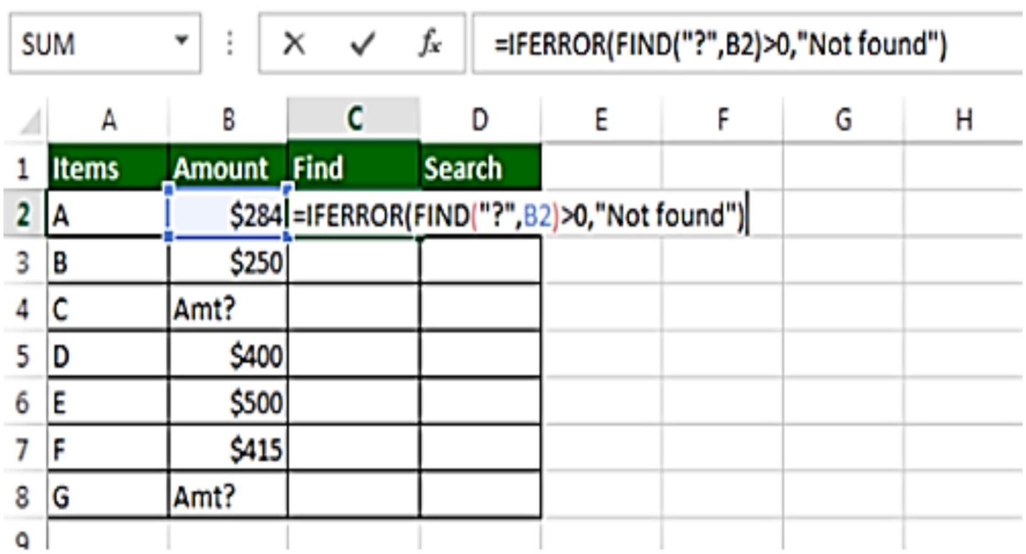
Finding a particular character in a text string

This is done with the Find Function. The function is case-sensitive. Also, the IFERROR function will bring out the value as output i.e. when there is an error when using the Find function. Example below;

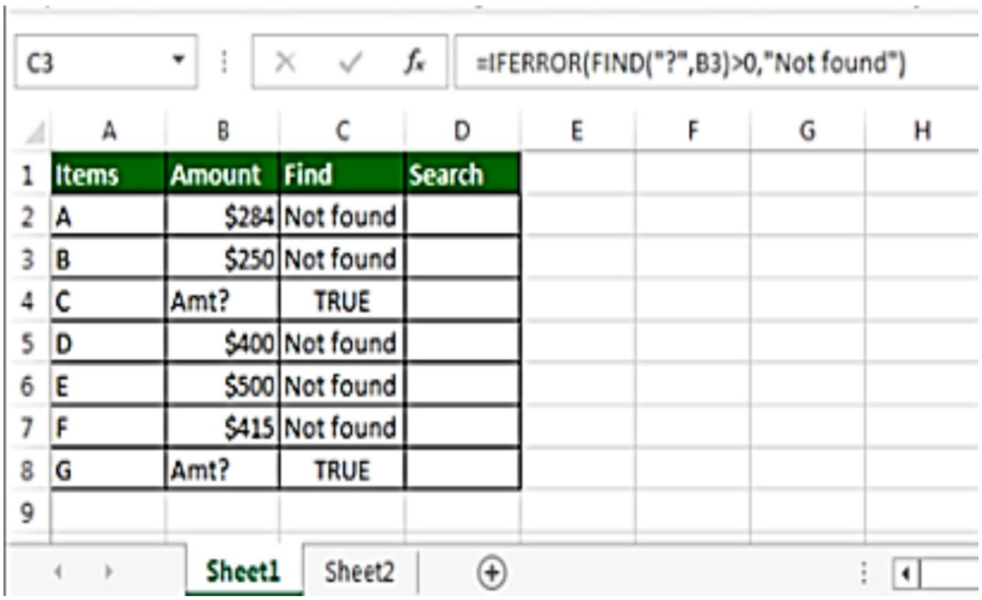
In the image below, there is a list of items and their amounts. If you look well, you will notice that some of the amounts have a question mark instead of the actual amount.



Now, to find “?”, we will put in this formula **=IFERROR(FIND("?", B2)>0, "Not found")** in cell C2. Then, hit **Enter**.

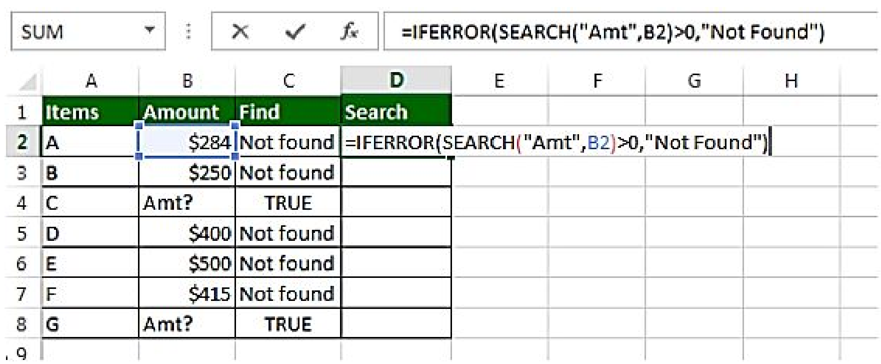


Copy the formula. Then, select the range C3:C8 and paste the formula. The cell that has the “?” will display “Not Found”.



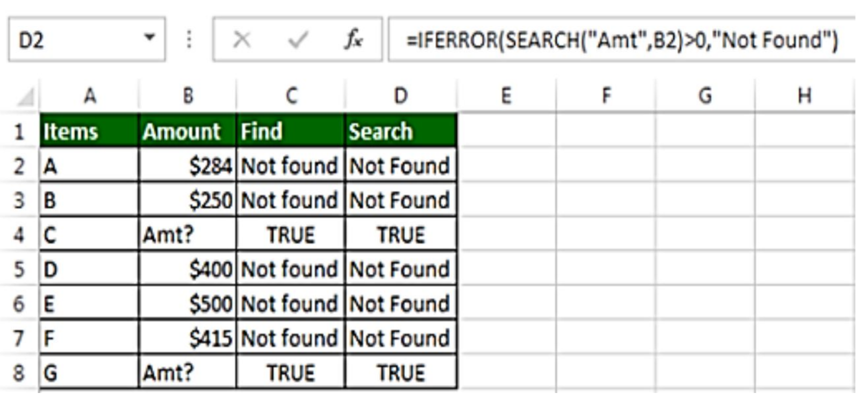
Items	Amount	Find	Search
A	$284	Not found	
B	$250	Not found	
C	Amt?	TRUE	
D	$400	Not found	
E	$500	Not found	
F	$415	Not found	
G	Amt?	TRUE	

Now, the Search function comes in. it will help find the character. Navigate to cell D2 and put in this formula **=IFERROR(SEARCH("Amt", B2)>0, "Not Found")**. Hit Enter.



Items	Amount	Find	Search
A	$284	Not found	=IFERROR(SEARCH("Amt",B2)>0,"Not Found")
B	$250	Not found	
C	Amt?	TRUE	
D	$400	Not found	
E	$500	Not found	
F	$415	Not found	
G	Amt?	TRUE	

Then, copy the formula. Select range D3:D8 and paste.



Items	Amount	Find	Search
A	$284	Not found	Not Found
B	$250	Not found	Not Found
C	Amt?	TRUE	TRUE
D	$400	Not found	Not Found
E	$500	Not found	Not Found
F	$415	Not found	Not Found
G	Amt?	TRUE	TRUE

Substituting text strings

The SUBSTITUTE function can be used to substitute characters in a text string. This is an easy process. Simply select the cell in which you want to get the result. Type =SUBSTITUTE (cell name, open quotes (“), the text you want to replace, closed quotes (“), open quotes, the text you want to replace with, closed quotes, and then close parenthesis. Press Enter.

SUM | =SUBSTITUTE(B1,"Cost","Expenditure")

	A	B	C	D
1	Production	Cost Data	Sales - Quarter 1, 2012	Sales - Quarter 2, 2012
2	Computer	5000	4700	4869
3	Laptop	6500	6487	6319
4	Smartphone	11000	10870	10938
5				
6		=SUBSTITUTE(B1,"Cost","Expenditure")		
7				

Counting specific characters in a cell

You can count the number of times that a character displays in a cell. This is done with the SUBSTITUTE and LEN functions. In the formula here; **=LEN(A1)-LEN(SUBSTITUTE(A1," a",""))**, “**A1**” stands for the cell reference while “**a**” stands for the character that is to be counted.

Using the image below, the cell which is selected contains this formula; **=LEN(B3)-LEN(SUBSTITUTE(B3, C3,"")).**

Count specific characters

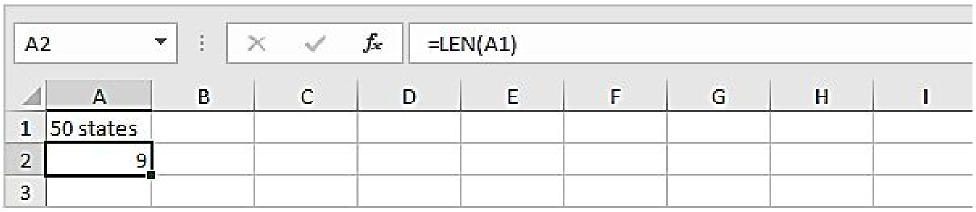
Text	Character	Count	Notes
Hannah	n	2	
Hannah	x	0	Character not found
Hannah	N	0	SUBSTITUTE is case-sensitive
Hannah	N	2	Use UPPER to count lower and upper case

How does this work?

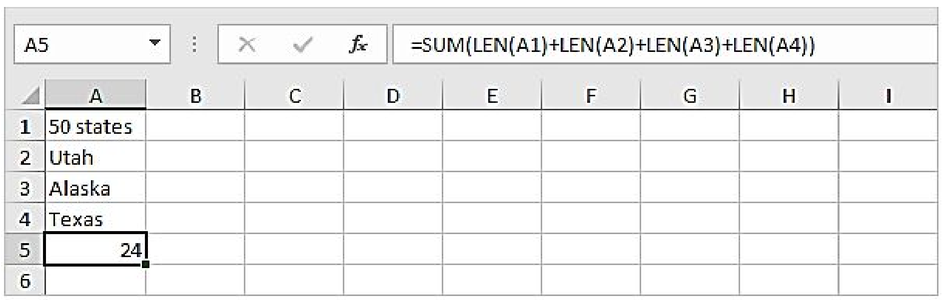
The SUBSTITUTE function removes the characters that are being counted in the source text. The original text minus the length of the text (minus the characters). The number of characters that were discharged with the

SUBSTITUTE function is the result and it is in line with the count of those characters. Note that this function, SUBSTITUTE, is case-sensitive.

LEN function calculates the total number of characters in a cell. It calculates both spaces.



You can use both functions to calculate the number of characters in a range of cells.



Adding a line break within a formula

People do wonder if it is possible to add a break line in a formula. The answer is YES! It is done with the CHAR function followed by number 10, as well as & operator. The operator combines the line break character with the other text in a formula.

For example, you want to calculate the total sales on a cell, and you used this formula =SUM(B1:B6). To add a break line to this formula, it changes to =&CHAR(10) & SUM(B1:B6).

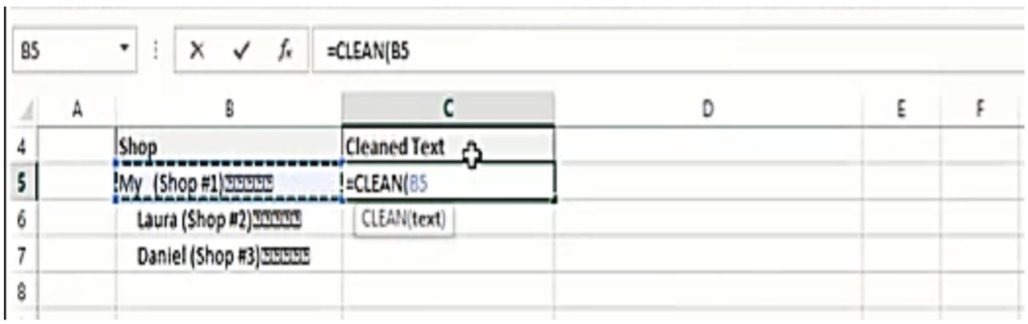
After adding the line break, hit ENTER. You may or may not see a small strange box where the line break is. This means that the wrap feature is not on. So, to turn it on, pick the cell that contains the line break, then select Wrap in the ribbon. This will display the line break in the cell and the square box will disappear.

Cleaning strange characters from text fields

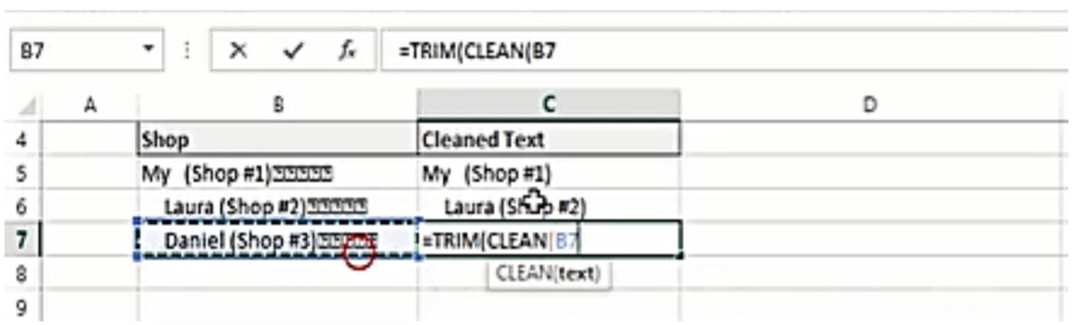
While working on your worksheet, you may have some strange characters on your work and you would like them to be removed. This mostly occurs when you are importing from external databases.

To fix this problem, the CLEAR function comes in. This function removes all non-printable characters.

Simply enter the formula =CLEAN (then put in the text you want to clear). You can do this by tapping on the cell or cells that contain the strange characters.



Also, to remove unnecessary spaces, you can use the TRIM function together with the Clean Function. The formula is **=TRIM (CLEAN, followed by the text or the cell reference)**

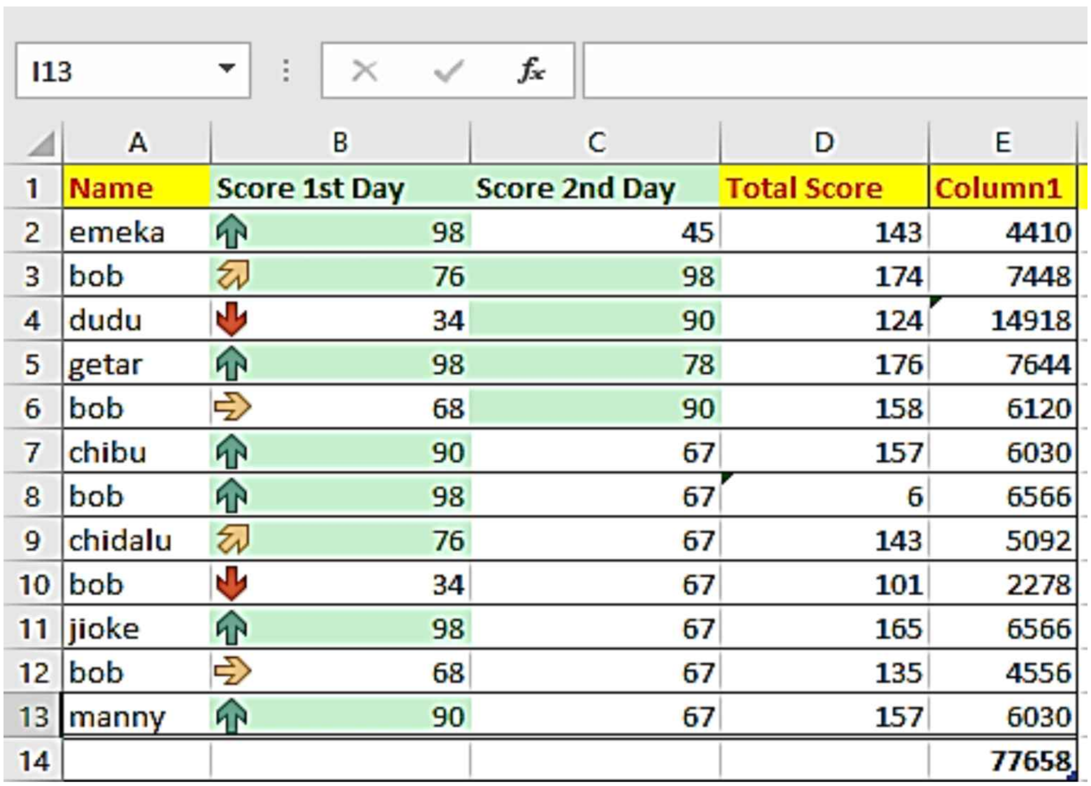


Adding leading zeros in Excel

You may want to add leading zeros to numbers if you have a variety of different ranges of numbers but they have a different amount of numbers within them. In other words, if there is a number that starts with 100 and there are other numbers that are just single digits but you want all of your data to look uniform and if they don’t have numbers in the hundreds place, you want there to be zeros.

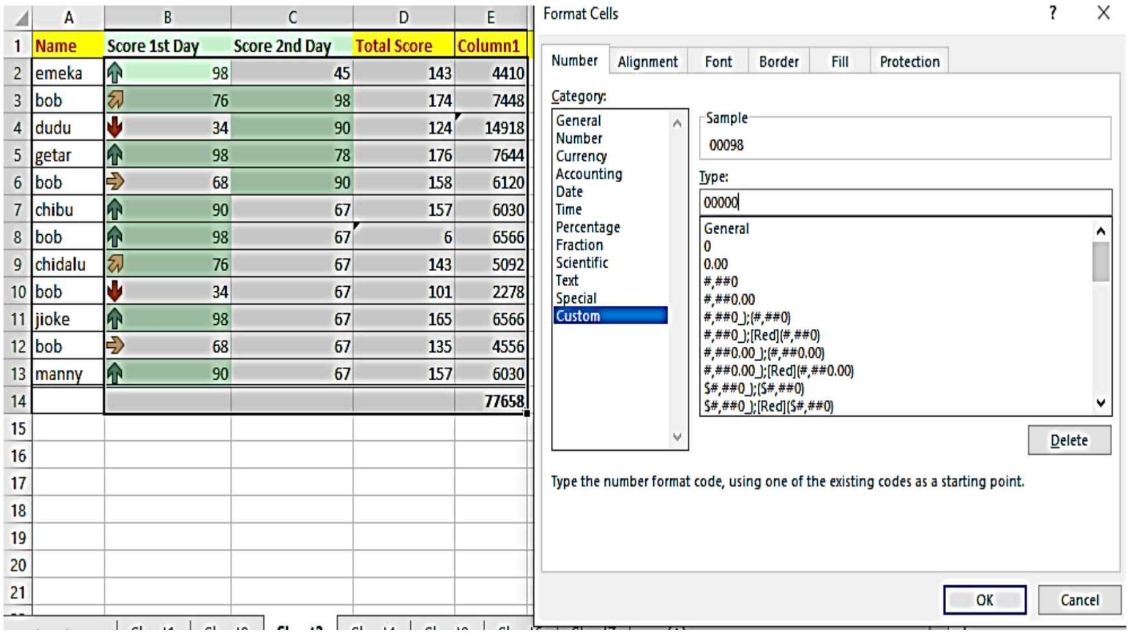
You want those leading zeros to be there to make everything uniform. Also, if you just want to add a couple of zeros to any data that exists for any reason, there are ways to do that. So, the first thing to do is to select the data you want to add that information to.

Here, I have cells containing two-digit numbers, three-digit numbers, four-digit numbers, and a five-digit number. So, I will try to make everything even. I want all of these numbers to have leading zeros so that they can be of the same length.



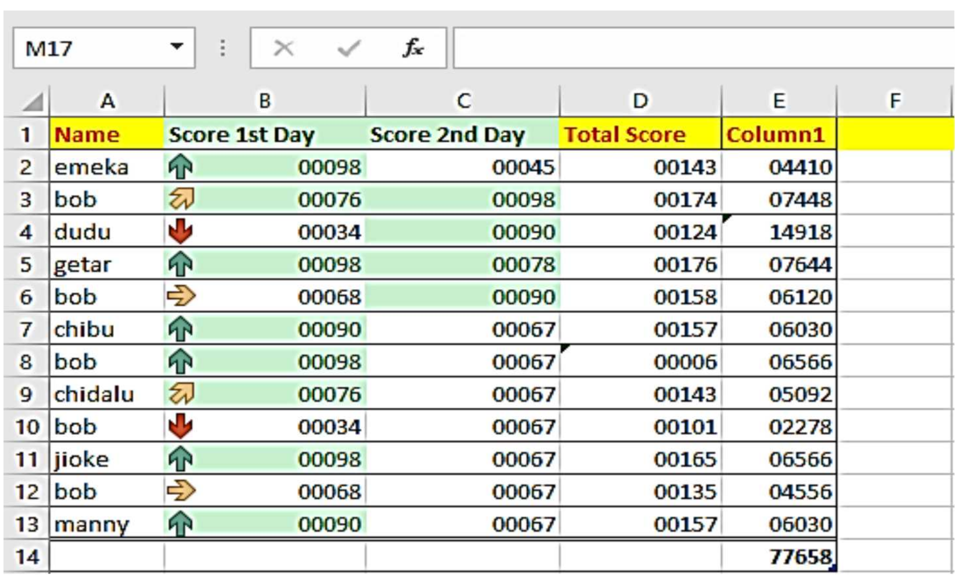
	A	B	C	D	E
1	Name	Score 1st Day	Score 2nd Day	Total Score	Column1
2	emeka	98	45	143	4410
3	bob	76	98	174	7448
4	dudu	34	90	124	14918
5	getar	98	78	176	7644
6	bob	68	90	158	6120
7	chibu	90	67	157	6030
8	bob	98	67	6	6566
9	chidalu	76	67	143	5092
10	bob	34	67	101	2278
11	jioke	98	67	165	6566
12	bob	68	67	135	4556
13	manny	90	67	157	6030
14					77658

After choosing the cells, right-click, then pick Format Cells. Pick Custom. Up in the menu where it says General, type in zeros and the first two zeros that you type will be replaced by the actual numbers themselves because there are two-digit numbers. But if you continue to type and you make five numbers i.e. five zeros, you will see that the sample displayed for you has three leading zeros now followed by the actual number and that is going to populate your data.



	A	B	C	D	E
1	Name	Score 1st Day	Score 2nd Day	Total Score	Column1
2	emeka	98	45	143	4410
3	bob	76	98	174	7448
4	dudu	34	90	124	14918
5	getar	98	78	176	7644
6	bob	68	90	158	6120
7	chibu	90	67	157	6030
8	bob	98	67	6	6566
9	chidalu	76	67	143	5092
10	bob	34	67	101	2278
11	jioke	98	67	165	6566
12	bob	68	67	135	4556
13	manny	90	67	157	6030
14					77658

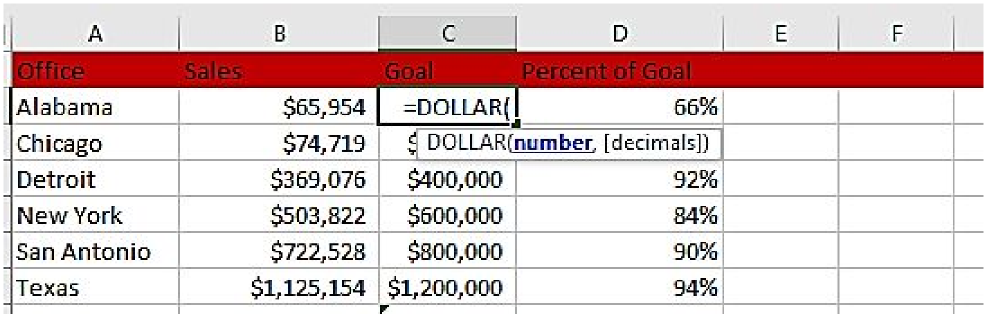
Pick OK and then on your worksheet, the leading zeros will be put in just the way it was planned. They all now have the same length with the five-digit number.



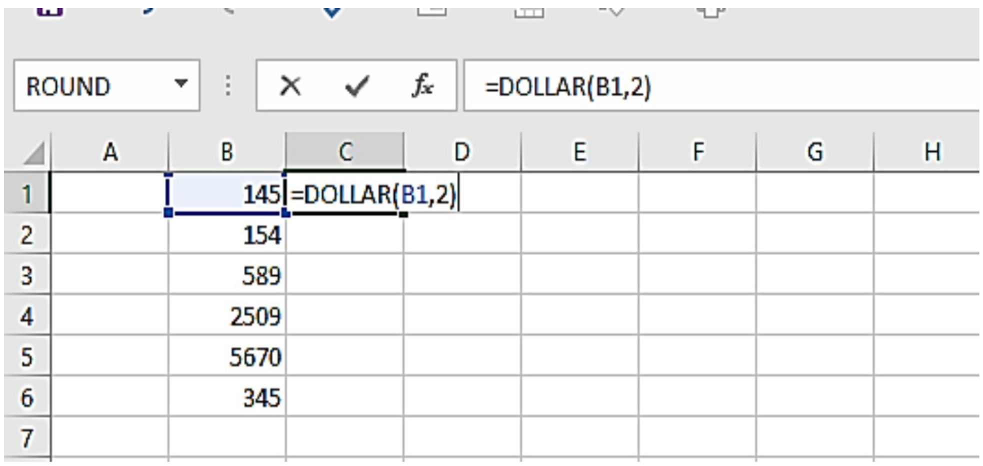
	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score	Column1	
2	emeka	00098	00045	00143	04410	
3	bob	00076	00098	00174	07448	
4	dudu	00034	00090	00124	14918	
5	getar	00098	00078	00176	07644	
6	bob	00068	00090	00158	06120	
7	chibu	00090	00067	00157	06030	
8	bob	00098	00067	00006	06566	
9	chidalu	00076	00067	00143	05092	
10	bob	00034	00067	00101	02278	
11	jioke	00098	00067	00165	06566	
12	bob	00068	00067	00135	04556	
13	manny	00090	00067	00157	06030	
14					77658	

Using the DOLLAR function

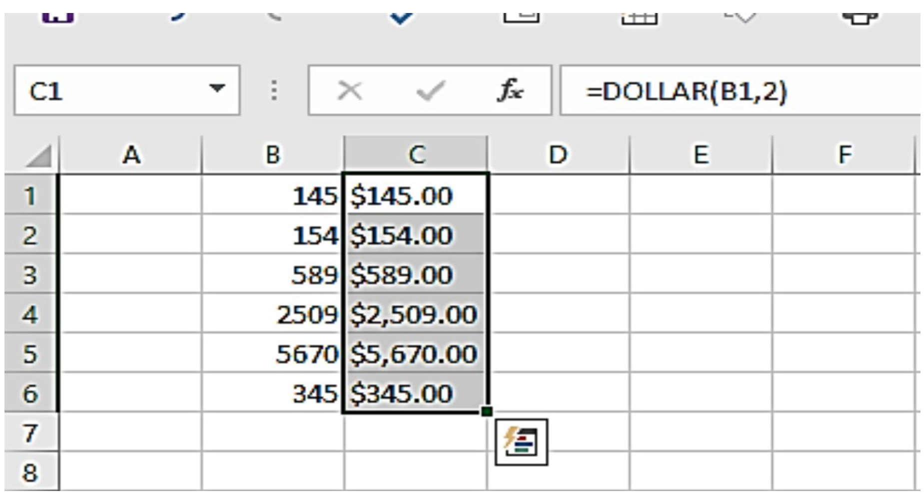
The Dollar function converts a number into a piece of text formatted as a currency. The foremost formula for this function is **=DOLLAR (Number, Decimals).** The number here stands for the number which needs to be converted while the DecimalPlaces stands for the number of decimal places needed in the converted number.



For example, in the image below, we are to convert the numbers to currency using this dollar function. So, on cell C1, enter in the formula **=DOLLAR(B1,2).** Press Enter.



You will get the number converted to the dollar currency. Use the fill handle to fill in other cells.



CHAPTER FOUR

USING FORMULAS WITH DATES AND TIMES

UNDERSTANDING HOW EXCEL HANDLES DATES AND TIMES

These are some of the prerequisites for mastering Excel. One of them is the ability to utilize Excel Date Formulas. This is because a lot of the data we deal with in our jobs includes dates and times, such as how old your customer or employee is today, when was the last time a certain client purchased from you, the length of a contract, and so on.

So, if you don't understand how Excel's date and time functions operate, you'll waste a lot of time manually converting dates to the appropriate month or year before you can start your research.

Given this, we believe we must begin this section by sharing with you our understanding of how Excel keeps dates and timings in spreadsheets.

You will be able to freely use the date and time formula in your worksheet if you have a strong grasp of date and time in Excel. And I promise you'll be more productive than ever when it comes to data analysis.

How Excel stores dates:

The way Excel maintains information is the cause of the majority of the misunderstanding around dates and timings. You'd think it'd remember the month, day, and year when it comes to dates, but that's not the case...

Excel keeps track of dates as a serial number that indicates the number of days that have passed since the year 1900 began. This implies that January 1, 1900, is just a 1. The year 1900 begins on January 2nd. The statistics have become very huge by the time we reach the current decade... The date of September 10, 2013, is saved as 41527.

How Excel stores time:

Excel uses the same serial numbering scheme for times as it does for dates. The day begins at noon (12:00 am or 0:00 hours). Because each hour represents a quarter of a day, it is denoted by the decimal number 0.041666...

That implies the time on September 10, 2013, at 9:00 a.m. (09:00 a.m.) will be saved as 41527.375.

When you provide a time without a date, Excel treats it as though it happened on January 1, 1900. To put it another way, 3:00 p.m. (15:00) is saved as 0.625. This might make performing arithmetic for time-only numbers (without a date) difficult, since subtracting 6 hours (6:00) from 3:00 am (03:00 hours) can result in a negative number, which will be recorded as an error: 0.125 – 0.25 Equals -0.125, which is shown as ######### on the screen.

In Excel, minutes and seconds function in the same manner as hours...

A minute is 1/60 of an hour, 1/24 of a day, or 1/1440 of a day in total, which equals 0.00069444...

A second equals 1/60 of a minute, 1/60 of an hour, 1/24 of a day, or 1/86400 of a day in total, which is 0.00001157407...

Understanding dates serial numbers

The date serial number, also known as the date-time serial number, is a number that Excel uses to record dates and times

When you look at a date in Excel, you're looking at a standard number that has been formatted to seem like a date. You may view the underlying date serial number if you set the cell format to 'General.'

The day is represented by the integer component of the date serial number, while the time is represented by the decimal portion. The date serial number 1 begins on January 1, 1900, i.e. 1/1/1900 has a date’s serial number of 1.

Example of a serial number in Excel Date and Time

Caution! After February 28, 1900, Excel dates are one day out. Excel acts as though the date 29 February 1900 existed, although it did not.

Microsoft incorporated this problem in Excel on purpose to keep it compatible with Lotus 1-2-3, the spreadsheet application that dominated the market at the time.

Lotus 1-2-3 was designed improperly as though 1900 was a leap year. This isn't an issue as long as all of your dates are after March 1, 1900.

Starting on January 1, 1900, Excel assigns a number value to each date. The first day of the year 1900 has a numeric value of 1, the second day of the year 1900 has a numeric value of 2, and so on. These are known as 'date serial numbers,' and they allow us to conduct arithmetic and employ dates in formulae

The Date Serial Number column presents the values of the Date column as date serial numbers. 1/1/2017, for example, has a date serial number 42736. Since December 31, 1899, the 1st of January 2017 has been 42,736 days.

Note: If you format the date serial number column as a Date, the values will seem to be the same as those in the Date column.

Entering dates

You may write in numerous date formats, and Excel will recognize it as a date, convert it to a date serial number and assign a date format to the column when you click ENTER.

Try entering (or simply copying and pasting) the dates below into an empty cell:

- 1-1-2022
- 1-1-22
- 1/1/2022
- 1/1/22
- 1-Jan-22
- 1-Jan 22

Entered	Excel Returns	Date Serial Number
1-1-2009	1/01/2009	39814
1-1-09	1/01/2009	39814
1/1/2009	1/01/2009	39814
1/1/09	1/01/2009	39814
1-Jan-09	1-Jan-09	39814
1-Jan 09	1-Jan-09	39814
1-Jan-2009	1-Jan-09	39814
1 Jan 09	1-Jan-09	39814
1/1	1-Jan-17	42736

Entering integers that seem like dates and are separated by a forward slash or hyphen will be recognized as a date, as shown in the table above. Even the month name is transformed to date when entering in a date.

Dates separated by a period, such as this 1.1.2009, or with spaces between digits, such as this 01 01 2009, will appear as text rather than a date. You've got to set some boundaries!

Note: When a cell displays **#####** in a cell, it typically means that the column is too narrow to show it.

However, if you expand the cell very large and it still shows **#####,** then, the date is a negative number, and Excel is unable to display negative dates.

Using Two-Digit Years to Enter Dates

Excel must determine if you mean 2022 or 2020 when you provide a date with two numbers for the year, such as 1/1/22.

Those with the years 29 or before are classified as 20xx, whereas dates with the years 30 or after are handled as 19xx.

Note: If you input the day and month components of a date, Excel will automatically insert the year depending on the time on your computer. This is useful information for data input.

Understanding time serial numbers

Times are also expressed as decimal fractions and employ a serial number format.

Hours: Because 24 hours equals one day, we may deduce that 24 hours has a time with a serial number of 1, which can be expressed as a time to represent 24:00, 12:00 AM, or 0:00. While 12 hours or noon has a value of 0.50 because it is half of a day, and 1 hour has a value of 0.41666' since it is 1/24 of a day.

Minutes: Because 1 hour is 1/24 of a day and 1 minute is 1/60 of an hour, 1 minute equals 1/1440 of a day, or its time serial number is 0.00069444'.

Seconds: whereas a second equals 1/60 of a minute, 1/60 of an hour, and 1/24 of a day. One second is also 1/86400 of each day or 0.000011574074074074 1 in time serial number form...

ENTERING TIMES

When entering time, you must use the h: mm format at the very least. i.e. a colon separates the hour and minutes, with no gaps from either side. When you provide the h: mm elements, the time will be represented in military time, for example, 2:00 PM is 14:00 in military time.

Excel will structure the cell as **h:mm: ss** if you provide a time that contains a seconds component, such as 3:15:40.

If you wish to format the time with AM/PM, just put a space after the time and then write AM or PM, or use the number format later. Listed below are some instances.

Entered	Excel Returns	Time Serial Number
9:00	9:00	0.375
1:00	1:00	0.041666667
13:00	13:00	0.541666667
12:30:45	12:30:45	0.521354167
1:00 PM	1:00 PM	0.541666667
11:15:30 AM	11:15:30 AM	0.469097222
16 : 45	0.697916667	0.697916667
4 : 45 PM	0.697916667	0.697916667

FORMATTING DATES AND TIMES

You can select how your date and time value will be by changing the format. To do this, simply pick the cell containing the date or time. Right-click > Format Cells. Click on the Date option and select the format you want.

Click on the Time option and select the time format you want to use.

PROBLEMS WITH DATES

Excel’s leap year bug

Since its inception, Microsoft Excel has wrongly assumed that 1900 is a leap year and that February 29 falls between February 28 and March 1 of that year. The problem originated in Lotus 1-2-3 and was intentionally introduced in Excel for backward consistency.

Every four years, there is a leap year, which has one extra day (February 29). Excel considers the year 1900 as if it were a leap year, even though it was not. In other words, Excel does not argue if you enter 2/29/1900 into a cell. This is interpreted as a legitimate date, and a serial number of 60 is assigned. However, if you put 2/29/1901, Excel recognizes it as a typo and does not convert it to date. Rather, it turns the cell input into a text string. How can a product utilized by millions of people every day have such a big flaw?

The solution is based on history. Lotus 1-2-3 faulted the first edition that led it to treat 1900 as a leap year. When Excel was introduced later, the designers were aware of the flaw and opted to replicate it in Excel to keep Lotus worksheet files compatible.

Why is this problem still present in subsequent Excel versions? According to Microsoft, the drawbacks of fixing this defect outweigh the benefits. Getting rid of the bug would wreak havoc on hundreds of thousands of current workbooks. Furthermore, resolving this issue would have an impact on Excel's interoperability with other date-based products. Because most users do not utilize dates before March 1, 1900, this defect now causes relatively few issues.

Pre-1900 dates

The number of days that have passed since January 1, 1900, is stored in Excel as a date. This implies that none of the interesting date features apply to dates from the 1800s. For historians and genealogists, this is a dilemma.

Boller presented a method for calculating elapsed days dating back to January 1, 1000. This formula has been slightly modified by me. The difficulty was addressed by Boller's original calculation, which included adding 1,000 years to the date. As a result, a legitimate date like December 26, 2008, becomes December 26, 3008. An invalid date, such as February 19, 1857, becomes February 19, 2857. This strategy works well since Excel can handle dates up to and including the year 9999.

In A4, you must specify a start date and an end date, and in B4, you must input both dates. When inserting dates, use a format like 2/17/1865. If the date is after 1900, Excel transforms it to a date serial number instantly. Excel preserves the date as text if it is before 1900.

You choose to add 1,000 years if the cell has a true date. Using the EDATE function and adding 12,000 months to the date is a simple method to achieve this. A date 1,000 years after a valid date in A4 is returned by =EDATE(A4,12000). In Excel versions before 2007, this function needs the Analysis Toolpak. You may use **=DATE(YEAR(A4)+1000, MONTH(A4), DAY(A4))** if you make sure the Analysis Toolpak is installed. If the cell does not include an actual date, you must separate the date, add 1,000 years, reconstruct the date, and convert it to a real date.

Inconsistent date entries

When inputting dates with two digits for the year, you should be cautious. Excel has various rules that come in to decide which century to use when you do so. And the restrictions differ depending on the version of Excel you're using. Dates in the twenty-first century are regarded as two-digit years between 00 and 29, whereas dates in the twentieth century are regarded as two-digit years between 30 and 99.

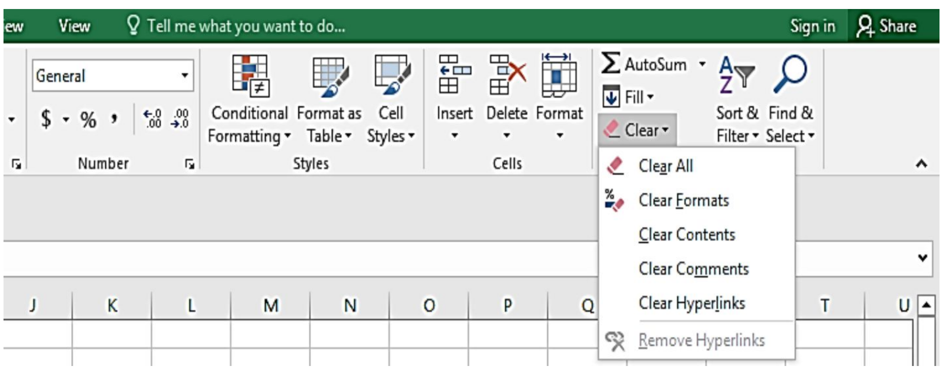
For example, if you type 12/15/28 into Excel, it will be interpreted as December 15, 2028. Excel, on the other hand, interprets 12/15/30 as

December 15, 1930. Because Windows has a default boundary year of 2029, this is the case.

You may either leave the default setting alone or alter it in the Windows Control Panel (use the spinner in the Calendar area of the Date tab of the Regional and Language Settings Properties dialog box).

Do you have a date problem? Date formatting in a column that is inconsistent is inconvenient. When you mistakenly receive two alternative date formats in a column, Excel sometimes refuses to allow you to change your mind. Sometimes it's as simple as changing the format; other times, this two-step approach is required.

Clear the formats. A white button that appears like an eraser may be found on the Home tab, Editing group. Clear Formats may be found by clicking on them. This converts the dates to serial numbers. Simply format the column in the appropriate date format at this point. All of the formats should now be in sync.

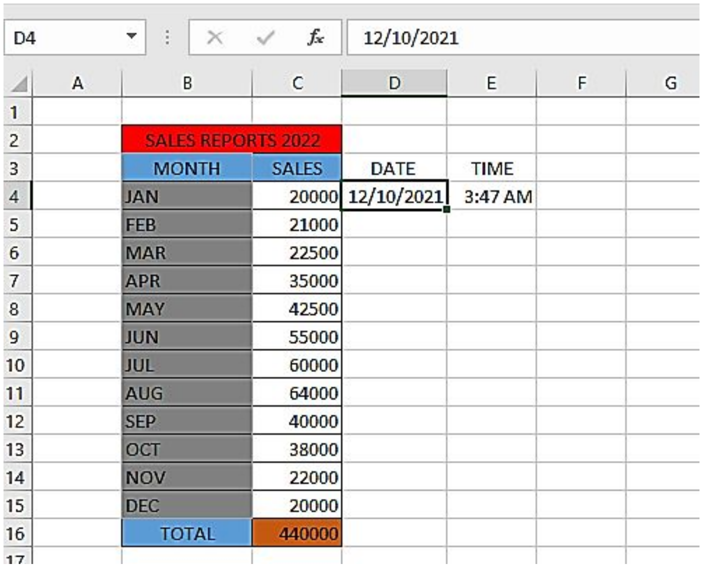


USING EXCEL'S DATE AND TIME FUNCTIONS

Getting the current date and time

Choose the cell. Then, press **Control key + Semicolon (;).** This will add the current date to that cell. To enter the time, select the cell, then press **Control + Shift + Semicolon (;)** on your keyboard. This will add the current time on that cell.

You can also enter date and time using some functions. To do this, simply Activate the cell you want to add a date on, type in this function on the cell **=TODAY()** and then press **Enter**. For the time, select the cell, type in this function **=NOW(),** and press **Enter**.

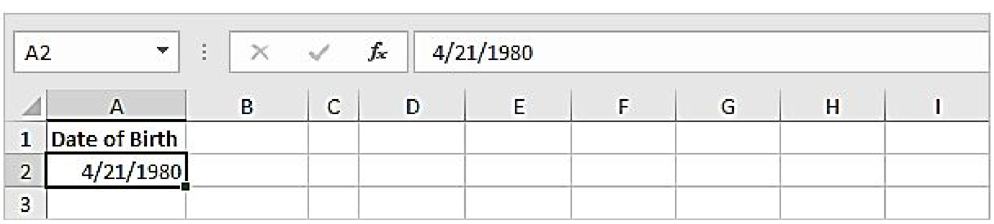


Calculating age

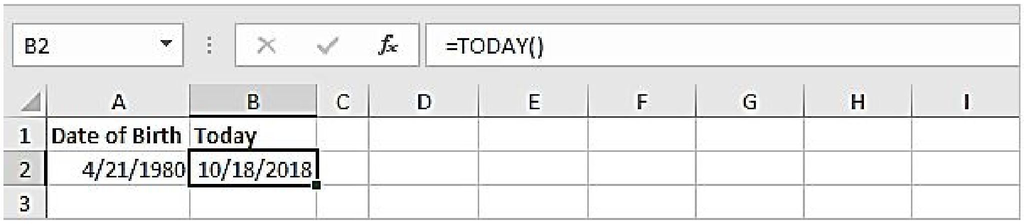
To determine age in Excel, we'll need the person's date of birth. The TODAY function in Excel may be used to compute the age. To do so, pick the cell containing the Date Of Birth and subtract it from today's date, which can be obtained using the TODAY function.

This will tell us the number of days between the date of birth and the current date. Then multiply it by 365, which is the total days in a year. This will offer you the age of the person. Follow the steps below to do so;

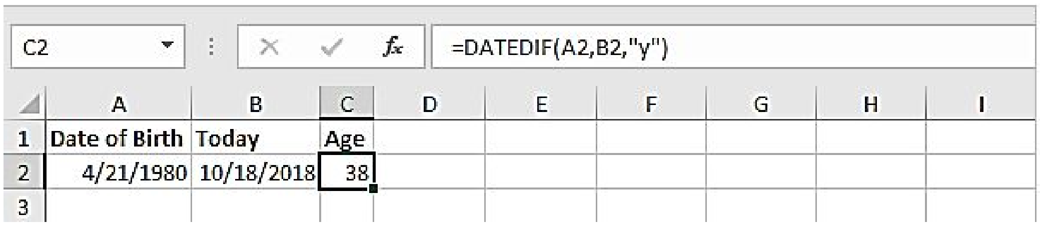
Put the birth date in the cell. Here, I used cell A2.



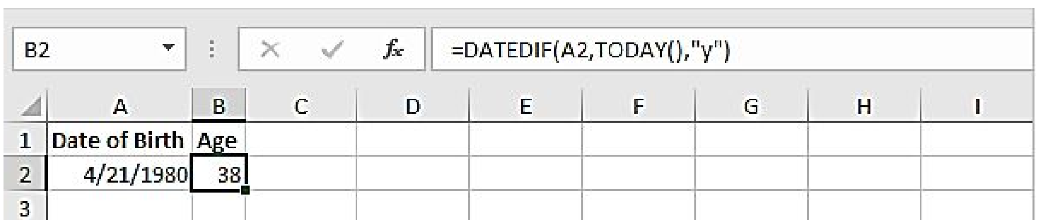
Put in the Today function. This is to display the present date.



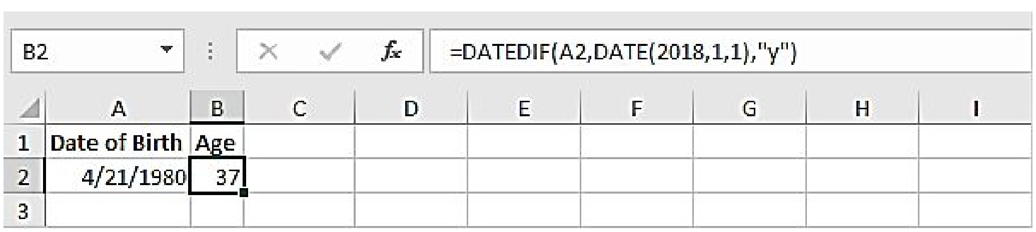
The DATEDIF function will calculate the person’s age.



Complete the “Y” value to get the number of the total years between the birth date and present date. You can compute the person’s age without showing the present date.



To know the person’s age on a specific date



Calculating the number of days between two dates

This is done using the DATEDIF function. It helps in figuring out the difference between various units such as dates, years, and months. To do this, you will first provide the start date in the 1st argument, then, the end date for the second argument, and then the “D” unit in the last argument.

DATEDIF(start_date, end_date, "d").

My example goes with the formula **=DATEDIF(A2, B2, "d")**. A DATEDIF function, unlike a subtraction function, could only remove an older date from a current date, but never the other way around. The algorithm gives a #NUM! error if the start date is later than the end date.

Calculating the number of workdays between two dates

This is done with the NETWORKDAYS function. **NETWORKDAYS (start_date, end_date, [holidays]).** Utilize the NETWORKDAYS.INTL method to define which days of the week should be designated weekends if you need to handle unique weekends (e.g., Saturdays and Sundays alone).

USING NETWORKDAYS.INTL

Generating a list of business days excluding holidays

In Excel, it's common to need to calculate the total number of working days between two dates. We often overlook weekends and holidays when calculating this. When calculating the number of workdays in Excel, you may use two separate procedures to eliminate weekends and holidays.

When calculating the total number of working days in Excel, the function **NETWORKDAYS** is utilized. Saturdays and Sundays are automatically counted as weekends when using this method to calculate workdays**.** **=NETWORKDAYS (start date, end date, [holidays])** is the notation for this function. The statement holiday is an optional argument in this case. It is used to compute the number of working days omitting holidays.

Take the example here, where I computed the number of workdays in two distinct scenarios for July. The holidays are included in one case and are not included in the other. Saturdays and Sundays are treated as weekends in both circumstances.

	A	B	C	D	E	F
1		Starting Date	Ending Date	Total Number of Working Days	Formula	Description of the Formula
2		1-Jun-18	30-Jun-18	21	=NETWORKDAYS(B2,C2)	Total number of working days excluding weekends as Saturday and Sunday by default
3						
4		1-Jun-18	30-Jun-18	18	=NETWORKDAYS(B4,C4,B7:B11)	Total number of working days excluding the holidays and weekends (Saturday & Sunday)
5						
6		Holidays				
7		13-Jun-18				
8		15-Jun-18				
9		16-Jun-18				
10		17-Jun-18				
11		18-Jun-18				

That the very first formula, as you've seen, calculates the entire number of working days, including holidays. The holidays are listed from cell B7 to cell B11, and the next formula calculates the number of working days except for the holidays.

=NETWORKDAYS(B2, C2) and =NETWORKDAYS (B4, C4, B7:B11) are the formulas used here

Count Workdays excluding Holidays and Particular Weekends

You learned the process of calculating working days with and without vacations in the last example when Saturdays and Sundays are generally omitted as weekends. Weekends are varied in several places throughout the globe.

Friday and Saturday are considered weekends in certain nations. The old formula will not work in this scenario. Another built-in function in Excel is NETWORKDAYS, which allows you to enter weekends of your choosing. NETWORKDAYS.INTL is the name of this function.

=NETWORKDAYS.INTL (start date, end date, [weekend], [holidays]) is the syntax for this function. The justifications for weekends and holidays are optional in this case. If the weekend statement is left blank, the algorithm will consider Saturday and Sunday to be weekends.

Look at the table below before using the function NETWORKDAYS.INTL to count the total number of working days. The values in this database are used in the NETWORKDAYS.INTL function's weekend parameter section.

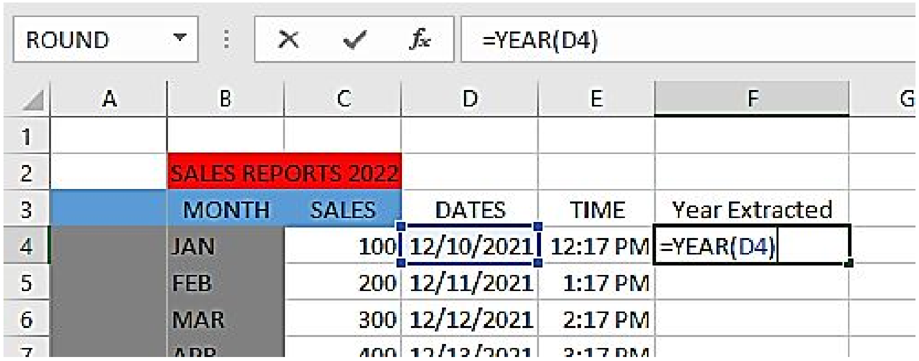
Weekend Days	Weekend Number
Saturday & Sunday	1 (default)
Sunday & Monday	2
Monday & Tuesday	3
Tuesday & Wednesday	4
Wednesday & Thursday	5
Thursday & Friday	6
Friday, Saturday	7
Sunday only	11
Monday only	12
Tuesday only	13
Wednesday only	14
Thursday only	15
Friday only	16
Saturday only	17

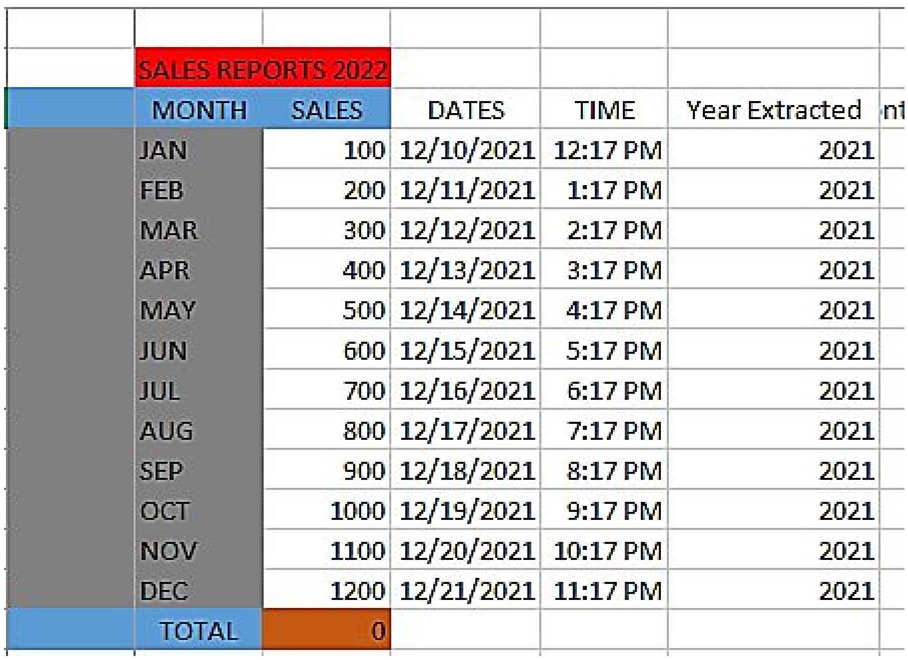
Extracting parts of a date

You can extract month, day, and year from a date in Excel. Below are the formulas you can do that with;

- Extract Year **=YEAR(D4)**
- Extract Month **=MONTH(D4)**
- Extract Day **=DAY(D4)**
- Extract Weekday **=WEEKDAY(D4)** or **=WEEKDAY(D4,1)**
- Extract Week Number **=WEEKNUM(D4)**

Simply choose the formula that matches your task and put it into an empty cell. Press Enter and the part of the date will be extracted. You can use the fill handle to fill in other cells.





	SALES REPORTS 2022				
	MONTH	SALES	DATES	TIME	Year Extracted
	JAN	100	12/10/2021	12:17 PM	2021
	FEB	200	12/11/2021	1:17 PM	2021
	MAR	300	12/12/2021	2:17 PM	2021
	APR	400	12/13/2021	3:17 PM	2021
	MAY	500	12/14/2021	4:17 PM	2021
	JUN	600	12/15/2021	5:17 PM	2021
	JUL	700	12/16/2021	6:17 PM	2021
	AUG	800	12/17/2021	7:17 PM	2021
	SEP	900	12/18/2021	8:17 PM	2021
	OCT	1000	12/19/2021	9:17 PM	2021
	NOV	1100	12/20/2021	10:17 PM	2021
	DEC	1200	12/21/2021	11:17 PM	2021
	TOTAL	0			

Calculating the number of years and months between dates

In Excel, the ratio between two dates is commonly calculated and shown as days, months, or years. I will show you how to use a formula to show the difference among two dates as A Months B days, C months, such as three years, 60 days, and so on.

The formula is DATEDIF (start date, end date, "y")&" years "&DATEDIF(start date, end date,"ym")&" months "

Start date and end date are the dates between which you wish to compute the years, months, and days. If the end date is less than the start date, the algorithm returns #NUM! as an error value.

Converting dates to Julian dates formats

The general formula for this is **=YEAR(date)&TEXT(date-DATE(YEAR(date),1,0),"000").**

In Excel, you may transform a date to Julian date format by creating a formula that includes the TEXT, YEAR, and DATE functions.

The "Julian date format" is a date stamp type that combines the year value of a date with the "ordinal day for that year" (i.e. 14th day, 100th day, etc.).

There are a few different versions. A date within that format may have a four-digit year (yyyy) or a two-digit year (yy), and the day number can be padded with zeros or not to always utilize three digits. For the date January 21, 2017, for example, you may see:

- 1721 // YYD
- 201721 //YYYYMM
- 2017021 // YYYYDDD

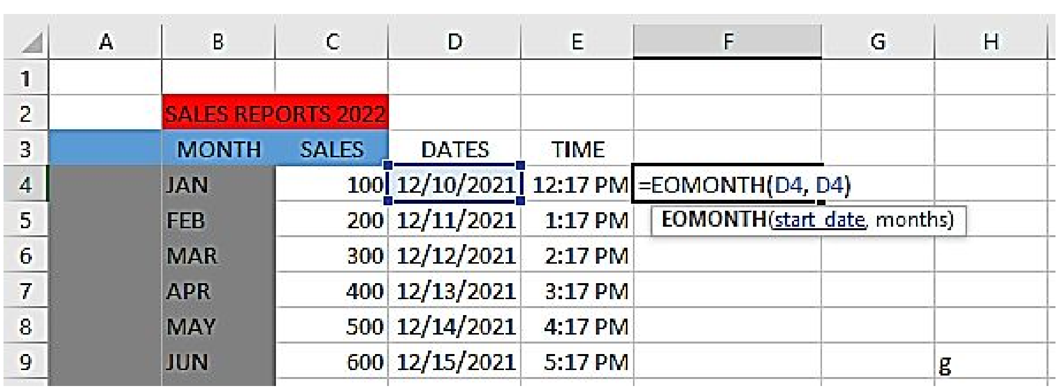
Returning the last date of a given month

To obtain the month's end date, we'll utilize Excel's built-in function, EOMONTH. This function will assist us in retrieving the month's final date.

This function's capabilities are not limited to knowing the current month's end date; we may also select to discover the prior month's last day, the following month's last day, and the last day of the month at a Custom determined separation of months.

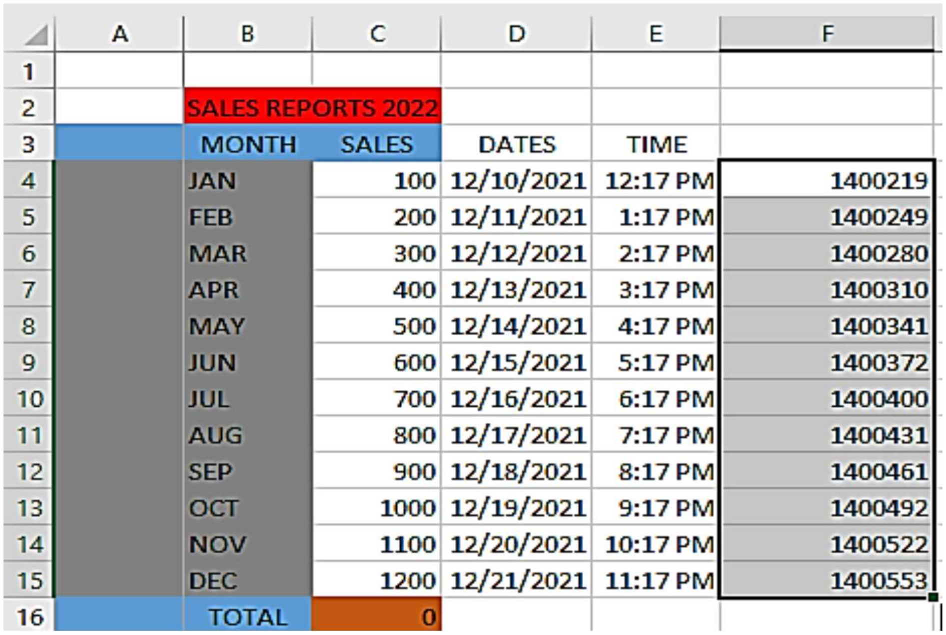
To find the last date of a given month, follow the steps below:

Put the date in a cell. Put in the formula =EOMONTH (put in the cell address)



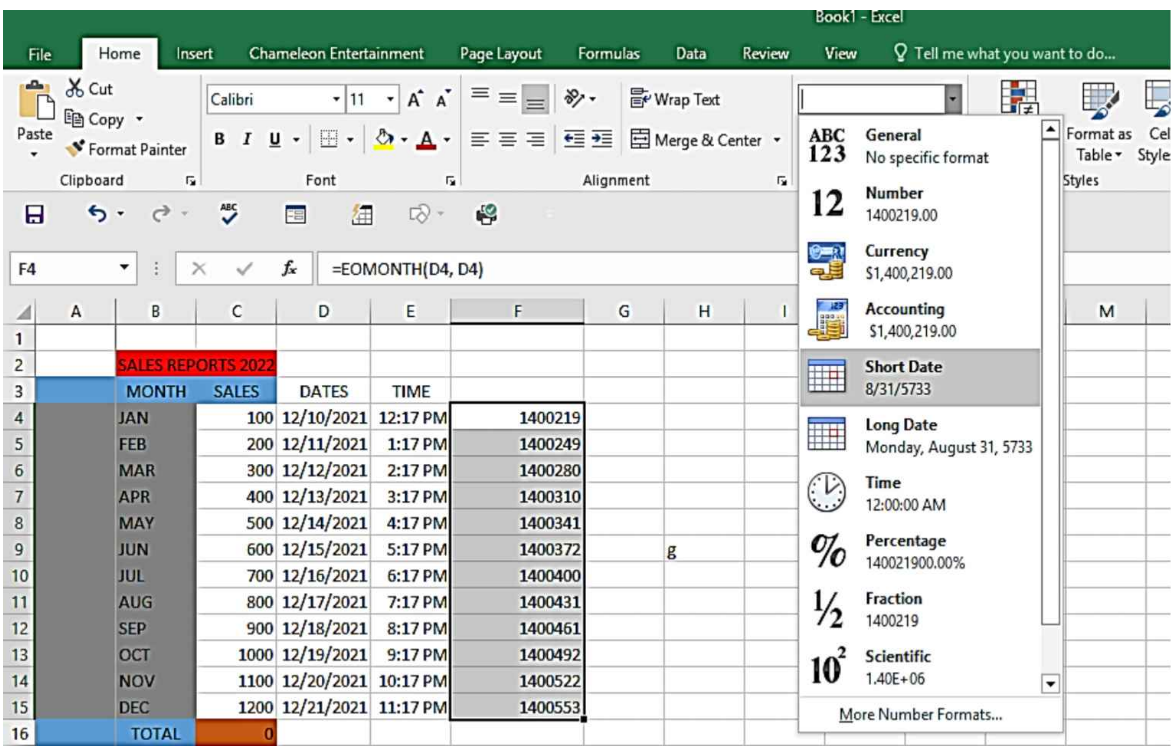
	A	B	C	D	E	F	G	H
1								
2		SALES REPORTS 2022						
3		MONTH	SALES	DATES	TIME			
4		JAN	100	12/10/2021	12:17 PM	=EOMONTH(D4, D4)		
5		FEB	200	12/11/2021	1:17 PM	EOMONTH(start_date, months)		
6		MAR	300	12/12/2021	2:17 PM			
7		APR	400	12/13/2021	3:17 PM			
8		MAY	500	12/14/2021	4:17 PM			
9		JUN	600	12/15/2021	5:17 PM			g

Press Enter. Use the fill handle to fill in other cells. The date will be displayed in the vale format.



	A	B	C	D	E	F
1						
2		SALES REPORTS 2022				
3		MONTH	SALES	DATES	TIME	
4		JAN	100	12/10/2021	12:17 PM	1400219
5		FEB	200	12/11/2021	1:17 PM	1400249
6		MAR	300	12/12/2021	2:17 PM	1400280
7		APR	400	12/13/2021	3:17 PM	1400310
8		MAY	500	12/14/2021	4:17 PM	1400341
9		JUN	600	12/15/2021	5:17 PM	1400372
10		JUL	700	12/16/2021	6:17 PM	1400400
11		AUG	800	12/17/2021	7:17 PM	1400431
12		SEP	900	12/18/2021	8:17 PM	1400461
13		OCT	1000	12/19/2021	9:17 PM	1400492
14		NOV	1100	12/20/2021	10:17 PM	1400522
15		DEC	1200	12/21/2021	11:17 PM	1400553
16		TOTAL	0			

Now, we will change the format to the date format. So, select the cells and click General on the home tab. Choose a Short **Date**.



USING THE EOMONTH FUNCTION

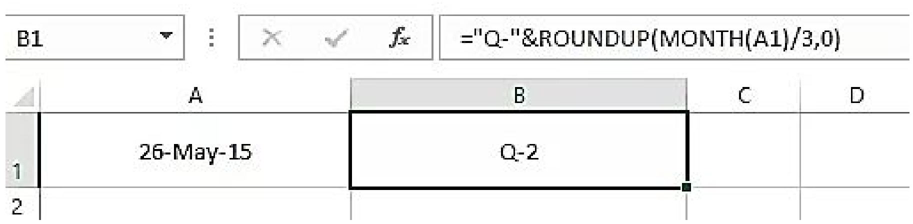
Calculating the calendar quarter for a date

There is no straight function in Excel for calculating a quarter from a date. You may, however, build a formula for this. You can compute a quarter from a date using a formula. Even so, you have the option of using more than one approach. Okay, as you may know, there are four quarters in a year, but you may derive a quarter from a date in a variety of ways.

The easiest technique to determine the quarter of a date is to combine the ROUNDUP and MONTH functions. It gives you the quarter as a number (like 1,2,3,4). The formula is as follows; **=ROUNDUP(MONTH(A1)/3,0)**

The formula yields 2 in the result when we use the date 26-May-2018. If you wish to add a Q before the quarter number, use the formula below.

="Q-"&ROUNDUP(MONTH(A1)/3,0)



What this formula entails

There are three elements to this formula. We utilized the MONTH function in the first portion and referenced the date, which outputs the month number.

Then, in the second section, we divided that month's number by three, resulting in a decimal number.

Finally, in the third section, we utilized the ROUNDUP function to round (that number with decimals) to the nearest quarter.

Here's what it's all about:

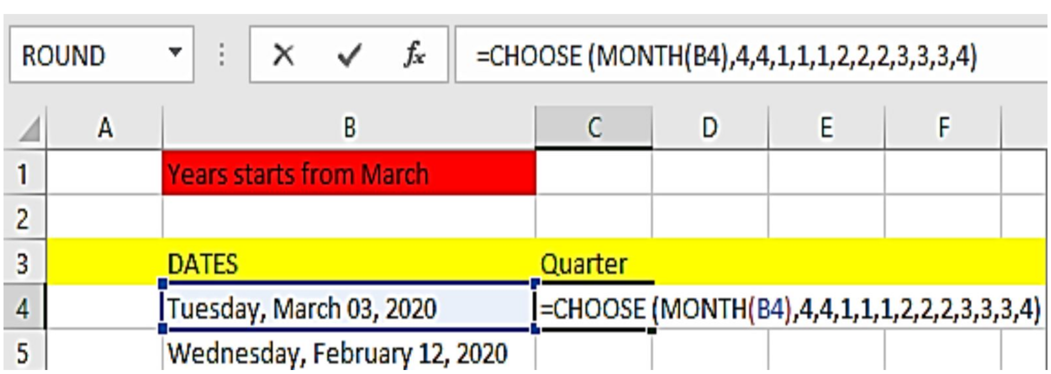
You are aware that there are four quarters and twelve months in a year. Right? And if you divide all of the month numbers by three (yes, only three), you'll end up with something like this. And if you round them up, you'll always receive the month's quarter number.

Calculating the fiscal quarter for a date

A fiscal quarter is the third quarter of a corporation's fiscal year. If a corporation's fiscal year runs from February to January, the first fiscal quarter will include the months of February, March, and April. In the same way, the second, third, and fourth quarters now have the prior three months' following three months.

It's also known as a company's financial quarter. To calculate this, use this generic formula **=CHOOSE(MONTH(date),1,1,1,2,2,2,3,3,3,4,4,4).** The Date stands for the date for getting the fiscal quarter.

The numbers in the formula are cleverly arranged. The formula perceives that the fiscal year started in January. Assuming it started from February, then the formula will be 4,1,1,1,2,2,2,3,3,3,4,4. So, in the image below are dates in range B4:B8. The fiscal year began in March. That means that the dates in March, April, and May should appear in the first quarter and so on. Put in the formula **=CHOOSE(MONTH(B4),4,4,1,1,1,2,2,2,3,3,3,4)**



It provides 1 for the first date since March 3rd is undoubtedly in the first quarter of the company's financial year, which begins in March. And

February is the fourth quarter since it is the last month of the year for such a company.

What is the mechanism behind it?

This is straightforward. The month of the supplied date is returned by the MONTH function. The month of March is represented by 3 in the formula above.

The CHOOSE method then returns the third entry from the array we've sent it. The number 1 is the third value in the array 4,4,1,1,1,2,2,2,3,3,3,4.

Similarly, the MONTH function gives 2 for the date of the FEB month. And the array's second value is 4.

So, this is how the method for determining a fiscal quarter for a particular date works.

Returning a fiscal month from a date

The EOMONTH function retrieves the final day of the month from a specified number of months ago or in the future. EOMONTH may be used to determine due dates, expiry dates, and other dates that must fall on the final day of the month.

The start date and months inputs are sent to the EOMONTH function. The start date field must be filled up with a valid Excel date. The month argument indicates how many months to travel ahead or backward in time; a positive number moves forward in time, while a negative number moves backward in time.

EOMONTH gives you a serial number that corresponds to a date in Excel. Use a number format of your choosing to show the result as a date.

For example, if you have May 12, 2021 in cell D5

- **=EOMONTH(D5,0) // returns May 31, 2021**
- **=EOMONTH(D5,4) // returns Sep 30, 2021**
- **=EOMONTH (D5, -3) // returns Feb 28, 2021**

You can also use this function to move through years.

- **=EOMONTH(B5,12) // returns May 31, 2022**
- **=EOMONTH(B5,36) // returns May 31, 2024**
- **=EOMONTH(B5, -24) // returns May 31, 2019**

Tips

- Add a positive value for future dates and a negative value for previous dates when calculating months.
- Whereas if the start date is not proper, EOMONTH will display the #VALUE error.
- It will be eliminated if the start date has a fractional time associated with it.
- The month's parameter will be eliminated if it includes a decimal number.
- The EDATE function may be used to transfer any date n months into the future or past.
- The date serial number returned by EOMONTH must be represented as a date.

Calculating the date of the Nth weekday of the month

As you may be aware, several significant days fall mostly on the nth day of the week, such as Christmas, which falls on the 4th Sunday in December, and Mother's Day, which falls on the 2nd Sunday in May.

Is there a method to compute the date of the nth day of the week in a given month and year, if your employer informs you the due date is the third Tuesday of September, apart from choosing a day out of the calendars? Let’s find that out.

So, write down the days of the week and their numbers in a table.

	DAYS	NUMBER		
	SUNDAY	1		
	MONDAY	2		
	TUESDAY	3		
	WEDNESDAY	4		
	THURSDAY	5		
	FRIDAY	6		
	SATURDAY	7		

Then, list the criteria you are to calculate the date based on such as the year, month, ordinal number, and days of the week.

	A	B	C	D	E	F	G	H	I
1									
2		DAYS	NUMBER		YEAR	MONTH	DAY OF WEEK	NTH DAY OF THE WEEK	
3		SUNDAY	1		2021	8	WED	3	
4		MONDAY	2						
5		TUESDAY	3						
6		WEDNESDAY	4						
7		THURSDAY	5						
8		FRIDAY	6						
9		SATURDAY	7						

Enter the formula below in an empty cell.

=DATE(E3,F3,1+H3*7)-WEEKDAY(DATE(E3,F3,8-VLOOKUP(G3,B3:C9,2,FALSE)))

ROUND | =DATE(E3,F3,1+H3*7)-WEEKDAY(DATE(E3,F3,8-VLOOKUP(G3,B3:C9,2,FALSE)))

	A	B	C	D	E	F	G	H	I	J
1										
2		DAYS	NUMBER		YEAR	MONTH	DAY OF WEEK	NTH DAY OF THE WEEK		
3		SUNDAY	1		2021	8	WED	3		
4		MONDAY	2							
5		TUESDAY	3							
6		WEDNESDAY	4							
7		THURSDAY	5							
8		FRIDAY	6							
9		SATURDAY	7							
10										
11				=DATE(E3,F3,1+H3*7)-WEEKDAY(DATE(E3,F3,8-VLOOKUP(G3,B3:C9,2,FALSE)))						
12										
13										

In this formula,

- E3 = The year
- F3 = The month
- H3 = The specified nth of the day of week
- B3:C9 = The table where you defined the numbers for weekdays
- G3 = The specified day of the week

Calculating the date of the last weekday of the month

Select an empty cell and enter the formula below;

=DATE(E3,F3+1,8)-WEEKDAY(DATE(E3,F3+1,8-VLOOKUP(G3,B3:C9,2,FALSE)))-7

Calculating elapsed time

Whether you're working on a task or parenting a child, assessing elapsed time is a typical task. The period between a beginning point and the present point in time is known as elapsed time. We may simply compute elapsed time using Excel formulae.

Calculating the amount of time that has passed in years

We assume that the beginning time and date from which we need to compute elapsed time is in Cell A1 for all of the examples in this article.

Use the calculation =(NOW()-A1)/365 to compute the elapsed time in years.

Months of elapsed time

The formula =(NOW()-A1)/30 may be used to compute the elapsed time in months. This gives the value in months of 30 days.

Weeks that have passed

We apply the formula =(NOW()-A1)/7 to determine the elapsed time in weeks.

The amount of time that has passed in days.

The formula for calculating elapsed time in days is =TODAY ()-A1. Fractions are also included in the outcome. To get rid of the values following the decimal point, utilize number formatting.

In working days, the amount of time that has passed.

The NETWORKDAYS formula, like this = NETWORKDAYS (A1, TODAY()), may be used to compute elapsed time in working days. This formula assumes a week of five working days, beginning on Monday. You may also provide it with an optional holiday list as a parameter.

Time elapsed in hours

We may use the calculation =(NOW()-A1) *24 to compute elapsed time in hours.

Time elapsed in minutes

Use the formula =(NOW()-A1) *24*60 to calculate elapsed time in minutes.

In seconds, the time has elapsed.

You may need to determine the elapsed time in seconds in certain machine-critical cases. Simply multiply =(NOW()-A1) *24*3600.

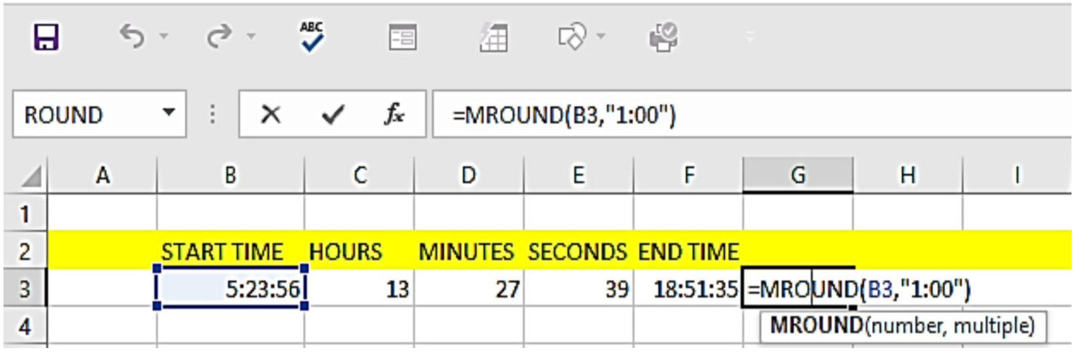
Rounding time values

Dealing with time values does have its set of difficulties. How to round off time numbers from seconds to minutes or minutes to hours is one of the challenges.

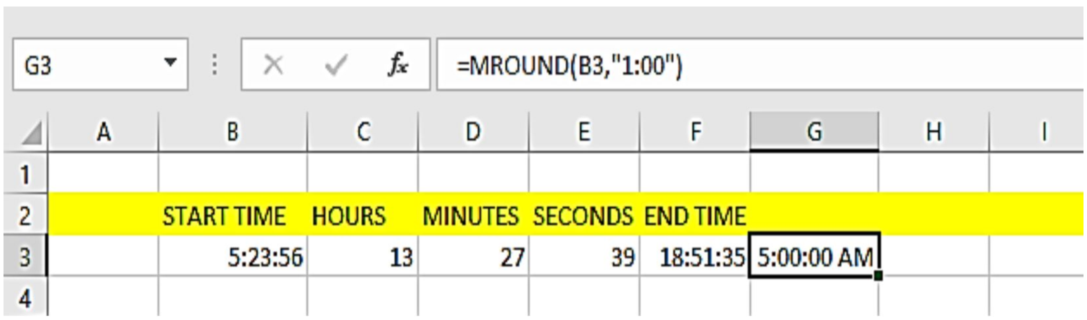
To round off time numbers, use the MROUND function. The MROUND function returns a number that has been rounded to the closest multiple.

When time values are rounded off, it is simpler to handle them. This advice will be valuable to HR people, IT security specialists, stock controllers, and others who deal with time values.

To do this, you will have to first format the number to time format (if they are not in time format). Then, select the cell and type the MROUND function. Then put in the cell address and the value you want to round up. To round up to the nearest hour, enter in **=MROUND (B3, “1:00”)**



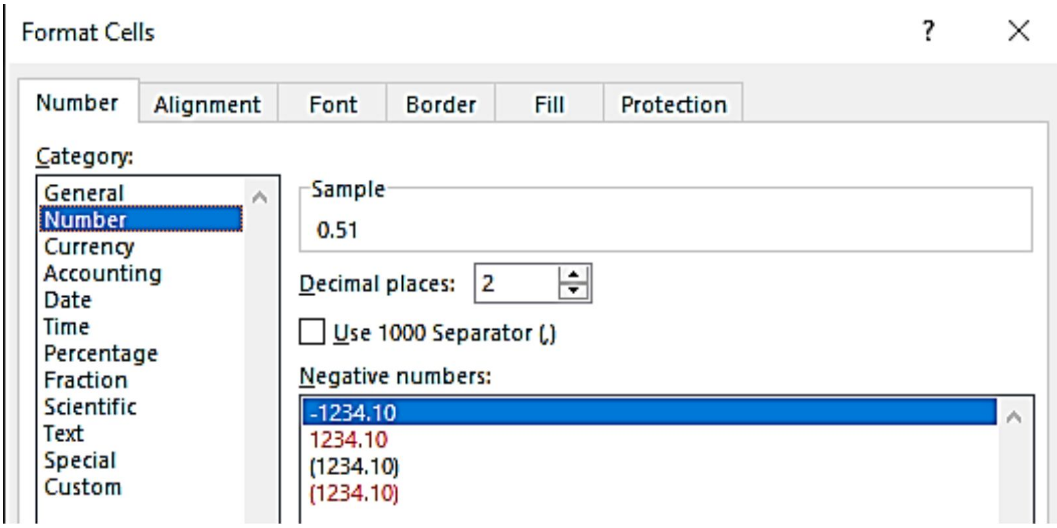
Press **Enter**. If the result is displayed in decimal, format the cell to Time.



To round up to the nearest minutes, enter the formula **=MROUND (B3, “0.01”).**

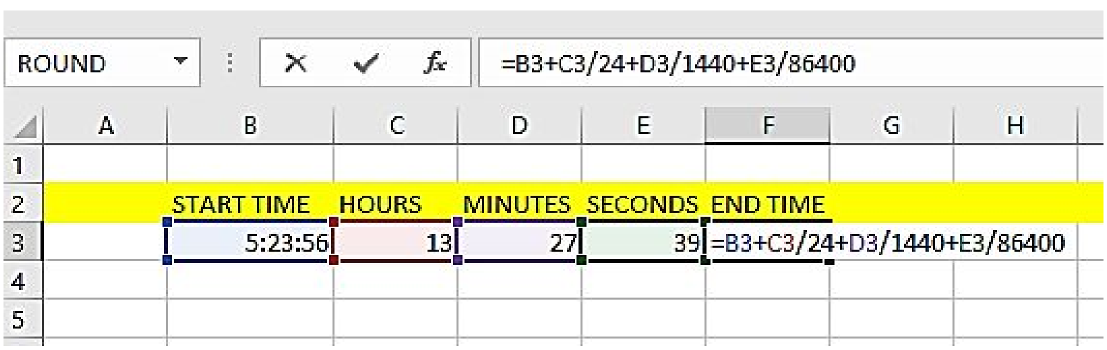
Converting hours, minutes, or seconds to a decimal.

Simply select the cell containing the hours. Right-click and select Format Cells. On the dialog box, select the decimal places you want to convert the hours of minutes to.

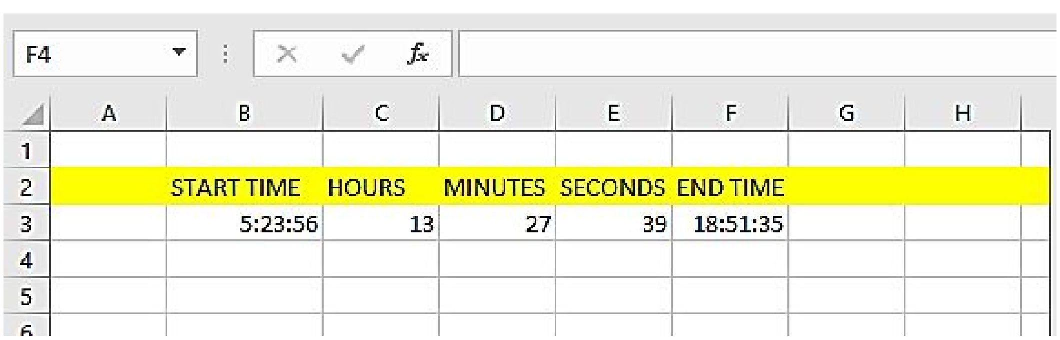


Adding hours, minutes, or seconds to a time.

Let’s say you want to add some seconds, hours, and minutes to your time in Excel, you will make use of this formula; **Start_time+hours/24+minutes/1440+seconds/86400.** With the table below, you want to add some time, to cell C3:E3, simply use this formula to do so; **=B3+C3/24+D3/1440+E3/86400**



Press **Enter**.



Explanation: A day has twenty-four hours, 1440 minutes, and 86400 seconds in it, therefore one hour is 1/24, one minute is 1/1440, and a second is 1/86400.

CHAPTER FIVE

USING FORMULAS FOR CONDITIONAL ANALYSIS

UNDERSTANDING CONDITIONAL ANALYSIS

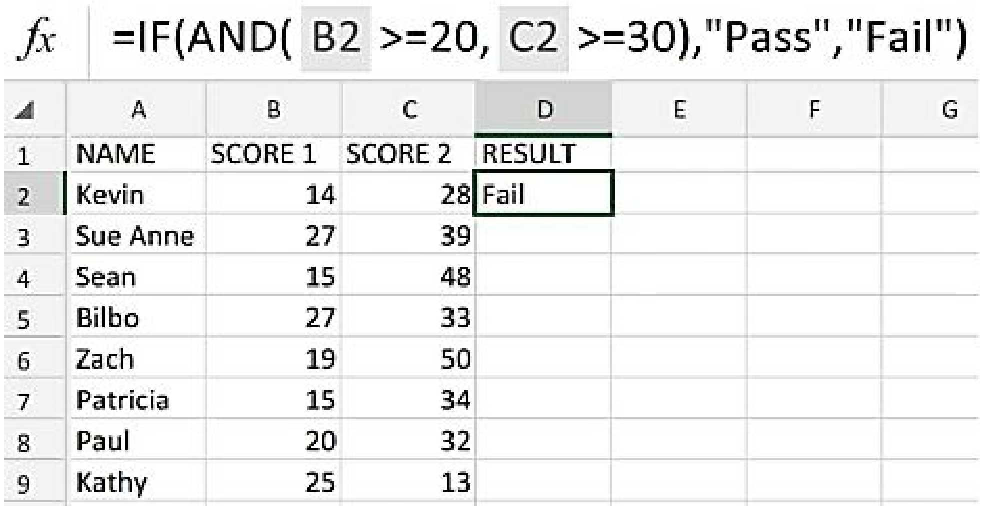
In Excel, we use the IF, AND, OR, NOT functions to get conditional formulas. The functions are used to check out if conditions are true or false as well as make logical comparisons among different expressions. These functions help us create basic logical IF (this), then (that) arguments.

Applying logical comparisons between different expressions and checking out if conditions are true or false applies to lots of tasks. We apply the **IF** and **AND** functions to generate our conditional formulas in Excel. To carry out this, follow the steps below;

First, enter the data for the work in your worksheet. In my worksheet here, we want to ascertain if a student that partaken in 2 different examinations, qualified with the criteria we specified.

	A	B	C	D
1	NAME	SCORE 1	SCORE 2	RESULT
2	Kevin	14	28	
3	Sue Anne	27	39	
4	Sean	15	48	
5	Bilbo	27	33	

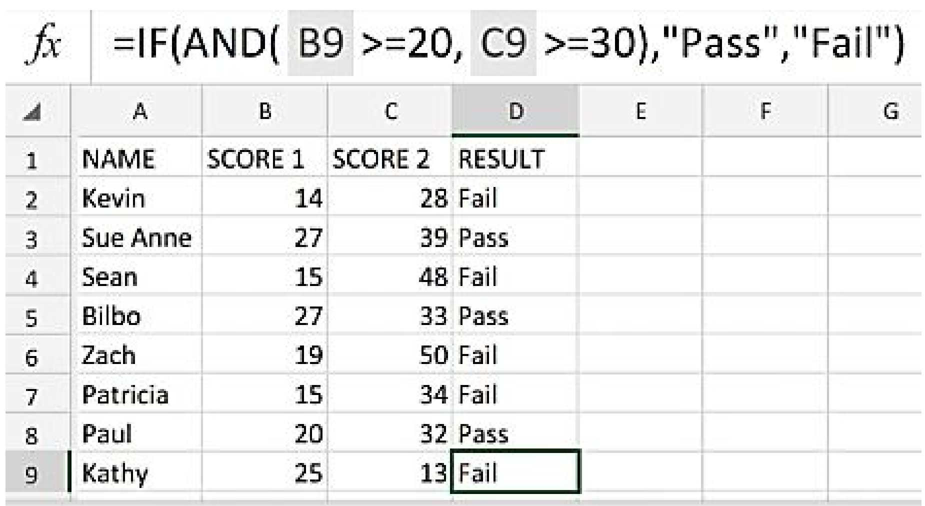
The conditional formatting will be applied in cell D2. Here is the formula; **=IF(AND(B2>=20,C2.>=30),”Pass”,”Fail”).** This means that if a student got 20 and 30 in both tests, it is likely that they will fail or pass.



fx =IF(AND(B2 >=20, C2 >=30),"Pass","Fail")

	A	B	C	D	E	F	G
1	NAME	SCORE 1	SCORE 2	RESULT			
2	Kevin	14	28	Fail			
3	Sue Anne	27	39				
4	Sean	15	48				
5	Bilbo	27	33				
6	Zach	19	50				
7	Patricia	15	34				
8	Paul	20	32				
9	Kathy	25	13				

Use the fill handle to fill in other cells.



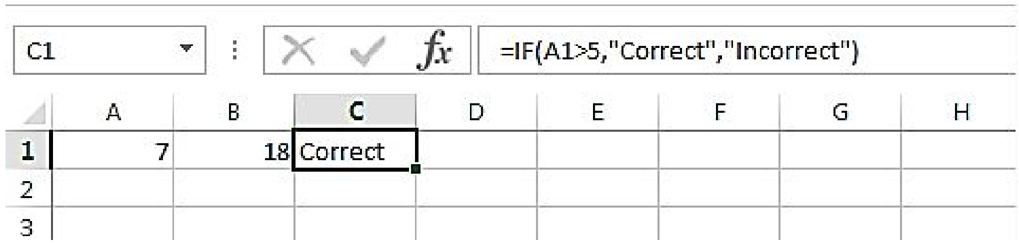
fx =IF(AND(B9 >=20, C9 >=30),"Pass","Fail")

	A	B	C	D	E	F	G
1	NAME	SCORE 1	SCORE 2	RESULT			
2	Kevin	14	28	Fail			
3	Sue Anne	27	39	Pass			
4	Sean	15	48	Fail			
5	Bilbo	27	33	Pass			
6	Zach	19	50	Fail			
7	Patricia	15	34	Fail			
8	Paul	20	32	Pass			
9	Kathy	25	13	Fail			

Checking if a simple condition is met

To do this, we will apply the IF function. This function will check if the conditions are met and will provide a specific value you choose when it is true. It will also provide another value when it is false. You can select the values yourself.

Put in this formula in a cell; **=IF(A1>5,"Correct","Incorrect").** This formula is for Excel to check if the value in cell A1 is bigger than 5. If it is true, it will display correctly. If it is false, it will display false.

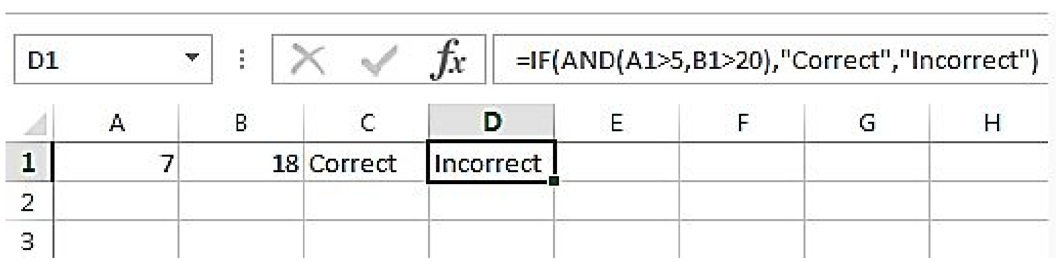


So, in the image above, the value in cell A1 is bigger than 5, so it displayed Correct.

Checking for multiple conditions

To check for multiple conditions, the AND function is applied. The function will display true if the criteria are met. It will display false negatives. Put in the formula in a cell; **=IF(AND(A1>5,B1>20), "Correct","Incorrect")**.

In the formula, Excel will determine if the value in cell A1 is greater than 5 and the value of cell B1 is greater than 20. If both are true, it will display Correct and will display Incorrect when false.



Validating conditional data

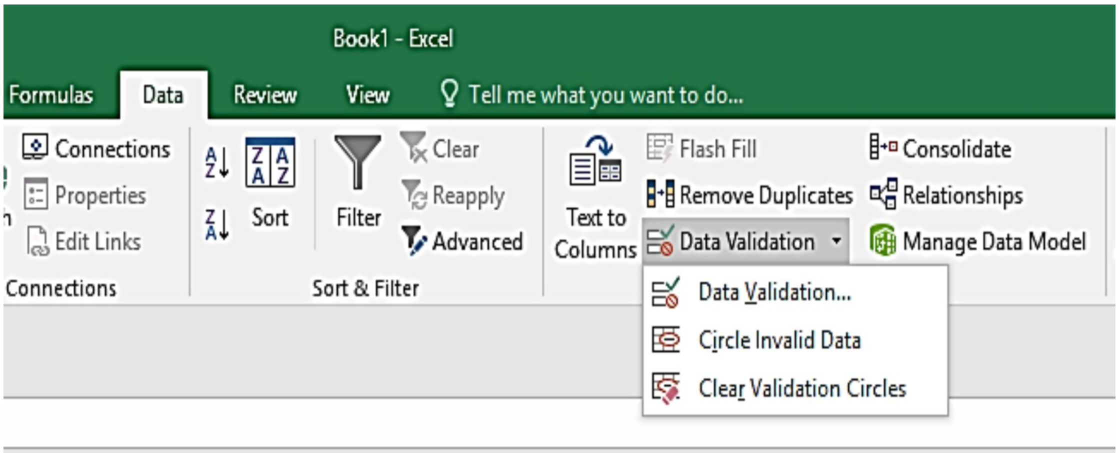
One may wish to regulate data entry into particular cells when putting up a worksheet for your users to ensure that all data inputs are valid and constant.

You could wish to allow just certain data types in a cell, such as numbers or dates, or restrict digits to a specific range and text to a specific length, among other things.

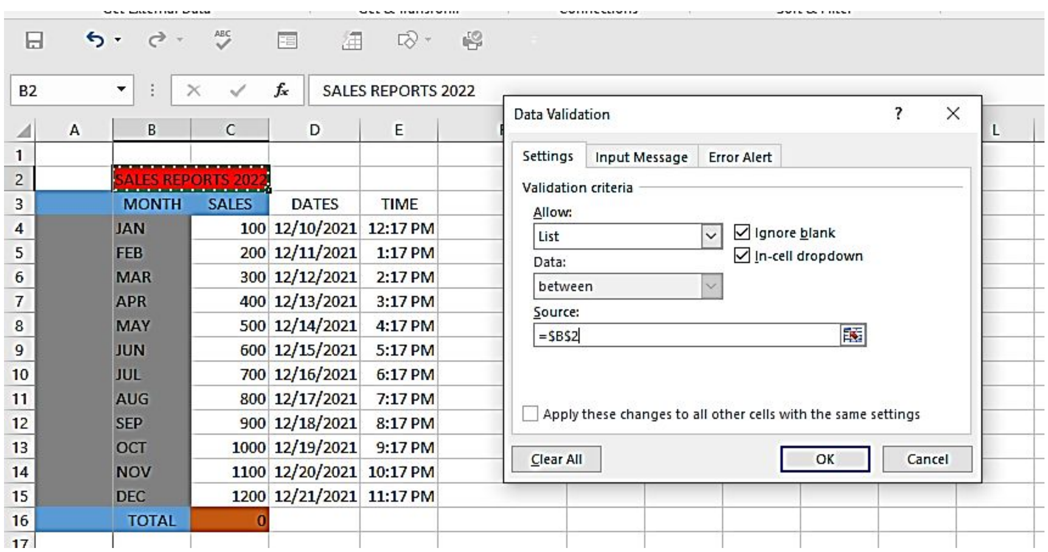
To avoid errors, you may wish to give a predefined set of permitted entries. All of these things are possible using Excel Data Validation.

What is data validation: Conditional data validation limits the options inside of an Excel drop-down list based on values in some other cell (or in another drop-down). We'll learn how to use Data Validation to construct conditional Excel dropdowns.

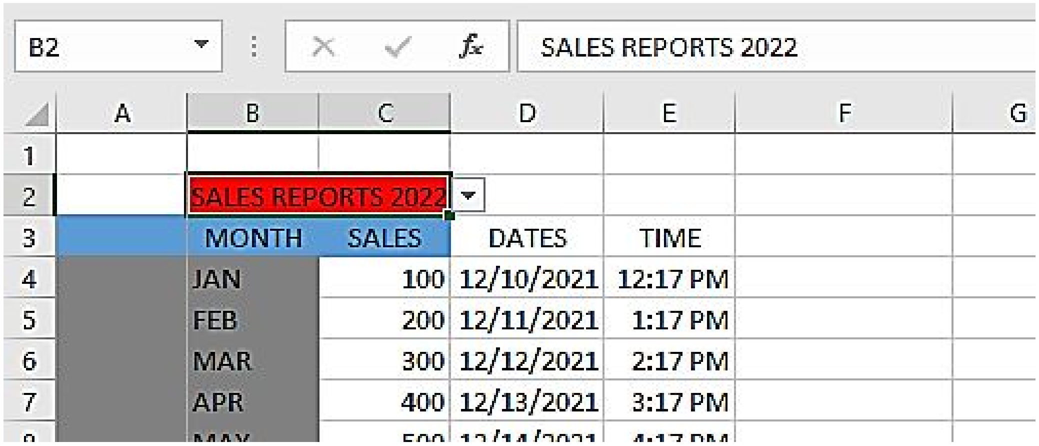
First, create a named range on your worksheet. Then, select a cell > click Data Validation on Data Tab.



Click on the down arrow and choose List. Then enter the name of the cell address. you can do so by clicking the cell.



Press Ok. This will create a drop-down arrow on the cell.



Select another empty cell and move to the Data Validation box with the same step above. Then, put in this formula; INDIRECT($B$2). It will create another drop-down arrow on the cell.

Checking if Condition1 AND Condition2 are met

This is done with the nested IF function. It comprises an IF inside another IF function. The formula goes this way;

IF(condition1, true_value1, IF(condition2, true_value2, false_value2))

- The 1st IF function is applied, and condition 1 is tested.
- The true value1 is performed if condition1 is true.
- The following IF function contains the false value1 variable. As a result, if condition1 is false, the IF function below will be executed.
- Condition2 is checked, and when it is true, true value2 is returned. False value2 is supplied anyway.

If necessary, you may layer up to seven IF functions.

Below is how this function works.

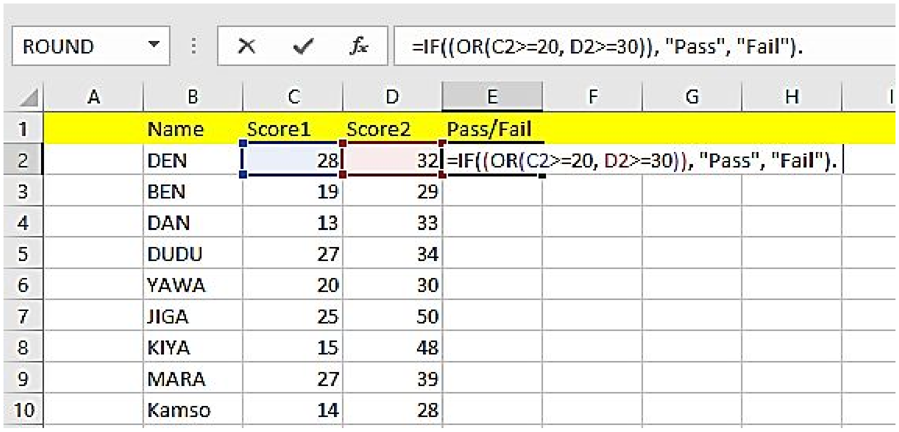
	A	B	C	D	E	F	G	H
1	Invoice ID	Product Line	Unit price	Quantity		Product Line	Tax	
2	750-67-8428	Electronics	74.69	7		Beauty	7%	
3	226-31-3081	Beauty	15.28	5		Electronics	5%	
4	631-41-3108	Sports	46.33	7		Sports	4%	
5	123-19-1176	Beauty	58.22	8				
6								
7								
8	=IF(B4="Beauty","7%",IF(B4="Electronics","5%",IF(B4="Sports","4%","Not applicable")))							
9	IF(logical_test, [value_if_true], [value_if_false])							
10								
11								

IF(B4=" Beauty"," 7%", IF(B4=" Electronics", IF(B4=" Sports"," 4%"," Not applicable")))

- The tax % for every product category is shown in the table on the right. The nested IF function is used to express this.
- Whether TRUE, we verify if the cell content is "Beauty," which yields "7%."
- If the cell content is FALSE, it is tested for "Electronics," which shows "5%" if TRUE.
- If not, it will double-check to see if the cell content is "Sports." If TRUE, "4%" is shown; if FALSE, "Not Applicable" is given.

Checking if Condition1 OR Condition2 are met

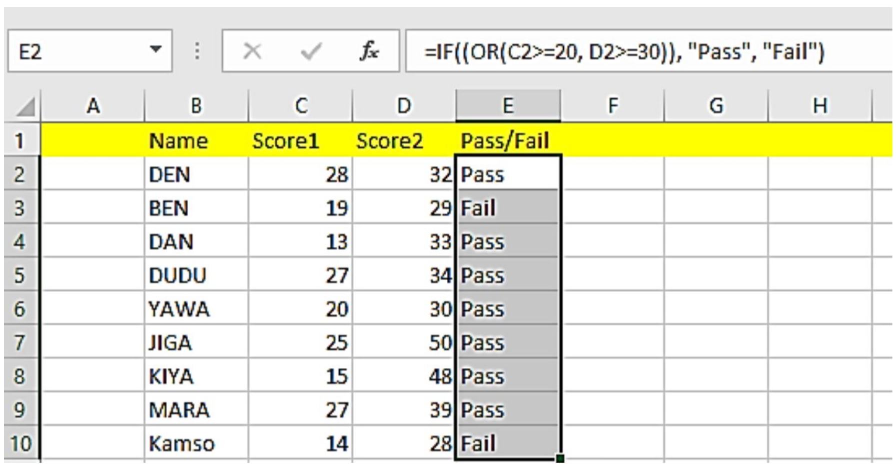
The IF and OR functions are used together to perform some tasks. Check out this formula; **=IF((OR(C2>=20, D2>=30)), "Pass", "Fail")**. This function is to determine if the 1st score is the same or bigger than 20 or if the 2nd score is the same or bigger than 20. Enter in the formula.



ROUND | =IF((OR(C2>=20, D2>=30)), "Pass", "Fail").

	A	B	C	D	E
1		Name	Score1	Score2	Pass/Fail
2		DEN	28	32	=IF((OR(C2>=20, D2>=30)), "Pass", "Fail").
3		BEN	19	29	
4		DAN	13	33	
5		DUDU	27	34	
6		YAWA	20	30	
7		JIGA	25	50	
8		KIYA	15	48	
9		MARA	27	39	
10		Kamso	14	28	

Press Enter. Then, use the fill handle to fill in the cells.



E2 | =IF((OR(C2>=20, D2>=30)), "Pass", "Fail")

	A	B	C	D	E
1		Name	Score1	Score2	Pass/Fail
2		DEN	28	32	Pass
3		BEN	19	29	Fail
4		DAN	13	33	Pass
5		DUDU	27	34	Pass
6		YAWA	20	30	Pass
7		JIGA	25	50	Pass
8		KIYA	15	48	Pass
9		MARA	27	39	Pass
10		Kamso	14	28	Fail

PERFORMING CONDITIONAL CALCULATIONS

Using SUMIFS

The SUMIF function sums integers depending on a single condition. According to its syntax, it considers one range, one criterion, and one sum range by default. The formula is; **=SUMIFS(sum_range, criteria_range1, criteria1, criteria_range2, criteria2,....)**

The SUMIFS function has the following arguments;

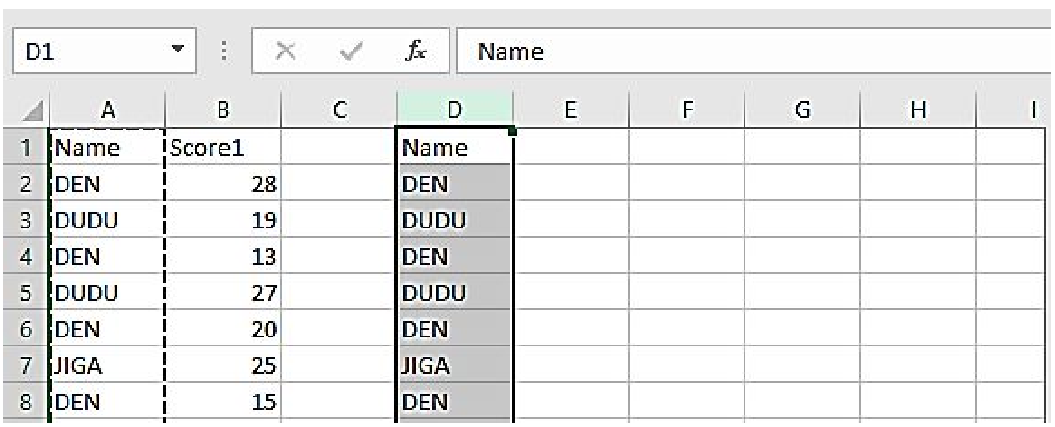
- The sum range means the range of cells that is to be summed up
- The criteria range1 means the first range of cells that are to be examined for a criteria match.

- The criteria1 means the criteria in opposition to which criteria range1 is to be examined
- The criteria range2 means the second range of cells that are to be examined for a criteria match.
- The criteria2 means the criteria in opposition to which criteria range2 is to be examined.

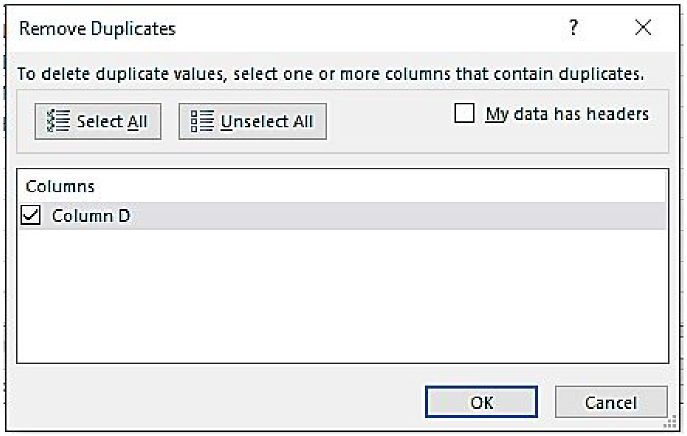
Summing all values that meet a certain condition

Let’s say you have data in range A1:B6. And you want to add up the values in a column (Column B) in regards to the text value in another column (Column A). To do this, you will have to remove the values that are duplicated in column A, then add up the values in Column B in regards to the unique text values in column A. Below is how you can do so;

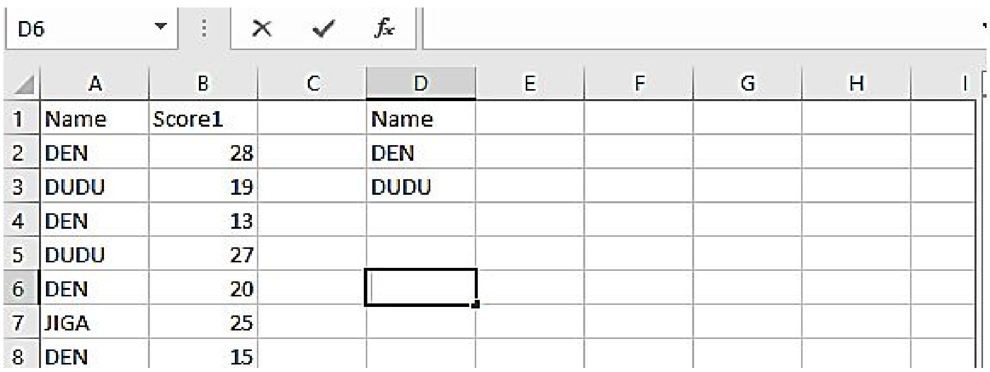
Pick the text values in the A column. Copy the values and paste them into another empty cell.



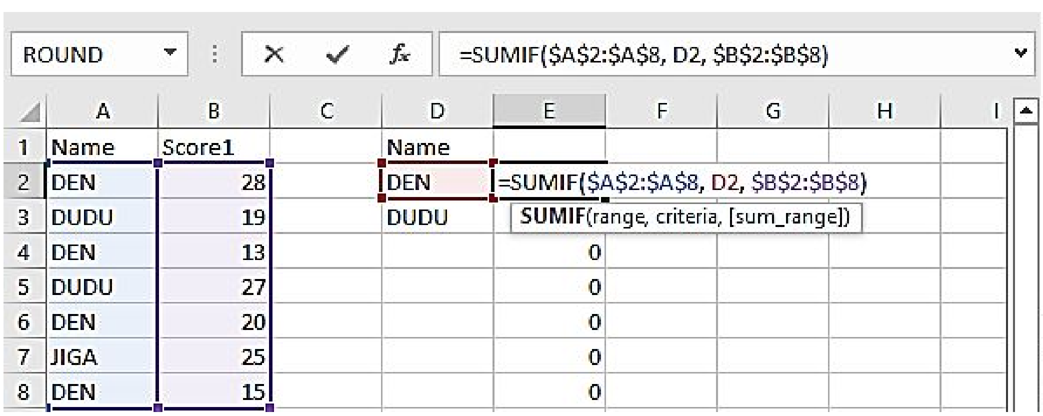
Select the new column you have pasted the values. Click the Data tab and select Remove Duplicates. Then, pick the pasted columns in the column option. Select OK.



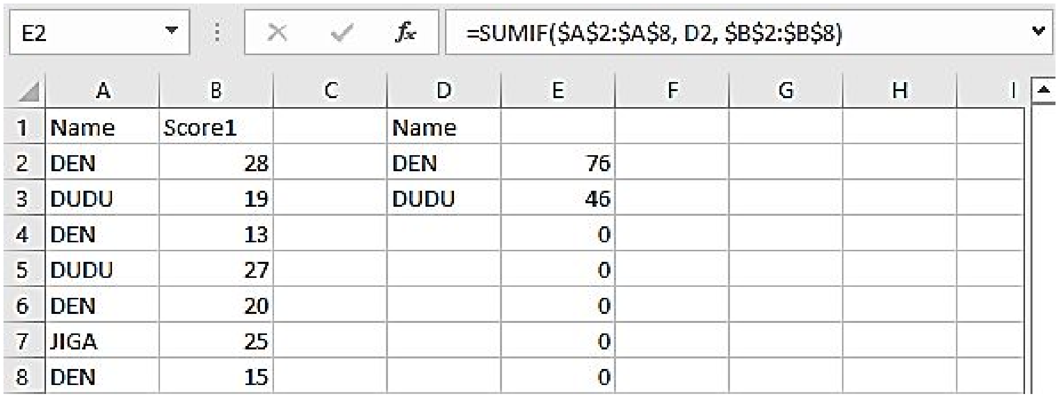
The duplicate values will be removed.



Choose an empty cell next to the pasted column. Enter the formula **=SUMIF($A$2:$A$6, D2, $B$2:$B$6)**.



Hit Enter. Then, use the fill handle to fill in the cell. The summed-up values will display.

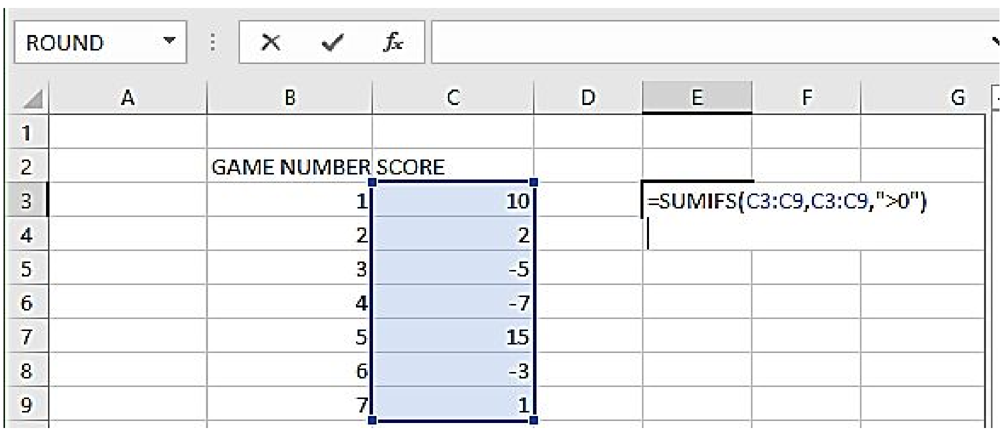


E2 =SUMIF($A$2:$A$8, D2, $B$2:$B$8)

	A	B	C	D	E
1	Name	Score1		Name	
2	DEN	28		DEN	76
3	DUDU	19		DUDU	46
4	DEN	13			0
5	DUDU	27			0
6	DEN	20			0
7	JIGA	25			0
8	DEN	15			0

Summing greater than zero

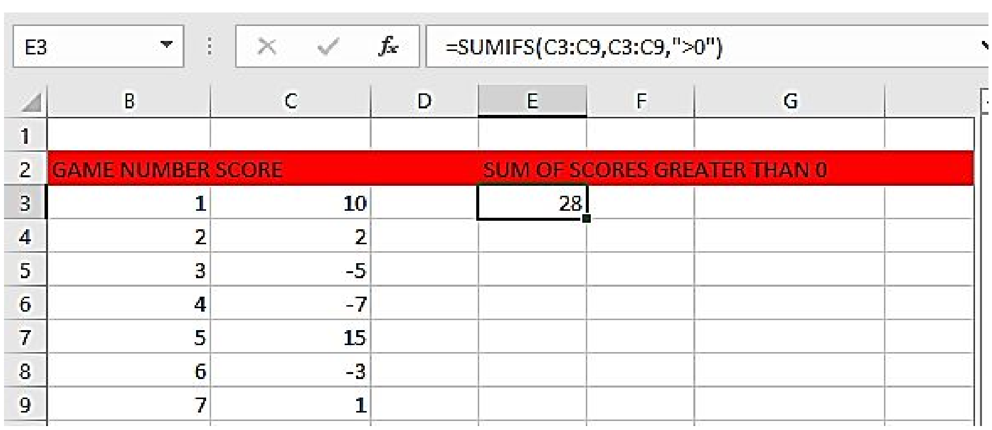
This is done using the SUMIFS function. Here, we will sum the values that are greater than zero. This is the formula; **=SUMIFS(C3:C9,C3:C9,">0")**.



ROUND

	A	B	C	D	E
1					
2		GAME NUMBER	SCORE		
3		1	10		=SUMIFS(C3:C9,C3:C9,">0")
4		2	2		
5		3	-5		
6		4	-7		
7		5	15		
8		6	-3		
9		7	1		

Press Enter.



E3 =SUMIFS(C3:C9,C3:C9,">0")

	B	C	D	E
1				
2	GAME NUMBER	SCORE		SUM OF SCORES GREATER THAN 0
3	1	10		28
4	2	2		
5	3	-5		
6	4	-7		
7	5	15		
8	6	-3		
9	7	1		

To total all positive Scores, we use the condition ">0." The conditions are also applied to analyze the data in the Score column in this example, thus the cell range C3:C9 is utilized as both the total and the criterion range.

Summing all values that meet two or more conditions

The SUMIF function sums integers depending on a single condition. According to its syntax, it considers one range, one criterion, and one sum range by default. However, if you prefer to add numbers depending on different criteria, you may utilize the choices below.

- You combine numerous SUMIF functions based on OR logic and apply them one by one to each condition.
- You must utilize the SUMIFS function, which is built to add values with various criteria using AND logic by default.
- You may likewise utilize the SUMIFS function with an integer variable to add numbers with various criteria using OR logic.

Based on OR logic:

You must sum up two or more SUMIF functions in a single calculation if you wish to include integers that fit either of the criteria (OR logic) from several criteria.

If you wish to aggregate order values for "Beans" and "Broccoli" goods using OR logic, you'll need to use the following pattern to combine two SUMIF functions into a single formula:

=SUMIF(range, criteria1, sum_range) + SUMIF(range, criteria2, sum_range)

=SUMIF(B2:B22,"Beans",D2:D22)+SUMIF(B2:B22,"Broccoli",D2:D22)

OR

=SUMIF(B2:B22,G2,D2:D22)+SUMIF(B2:B22,H2,D2:D22)

Based on AND logic:

You may use the SUMIFS function to add values from a range if all of the stated conditions are matched, which is based on AND logic. It's vital to remember that to add up values from the sum range, all of the conditions must be satisfied in a single or double range. SUMIFS has the following syntax:

SUMIFS(sum_range, criteria_range1, criteria1, criteria_range2, criteria2,...)

If you wish to total the quantities of orders supplied across two dates, you may utilize the SUMIFS function. You must specify two conditions within the same range, and the SUMIFS function adds the amounts of such orders when both criteria have been met.

Summing if values fall between a given date range

Apply the SUMIFS formula using start and end dates as parameters to sum data inside a certain date period. The SUMIFS function's syntax mandates you to first indicate the numbers, to sum up (sum range) before providing range/criteria pairs. The range (a list of dates) for both parameters would be the same in our scenario.

In light of the above, the typical formula for summing values between two dates are as follows:

With bound dates:

- ***SUMIFS(sum_range, dates,">="&start_date, dates, "<="&end_date)***

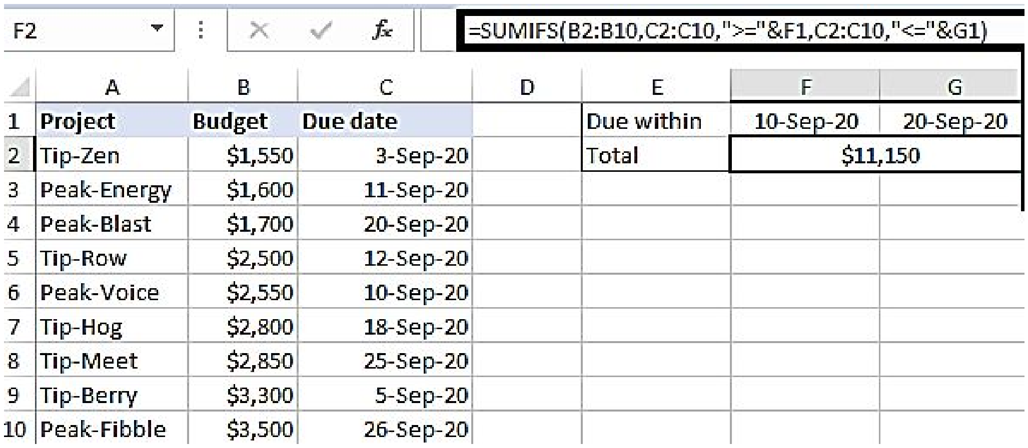
Without bound dates:

- ***SUMIFS(sum_range, dates,">"&start_date, dates, "<"&end_date)***

The difference here is found in the logical qualifiers. To add the lower and upper limit dates in the result, we apply greater than or equal to (>=) and less than or equal to (=) to the 1st formula. The 2nd formula, which excludes the start and finish dates, determines whether a date is larger than (>) or less than ().

Assume you want to add up all of the projects that are due within a certain time frame in the figure below. To do so, input the start and end dates in F1 and G1, respectively, then with the formula below, add up the budgets in B2:B10 between these dates, inclusive:

=SUMIFS(B2:B10, C2:C10, ">="&F1, C2:C10, "<="&G1)


F2 =SUMIFS(B2:B10,C2:C10,">="&F1,C2:C10,"<="&G1)

	A	B	C	D	E	F	G
1	**Project**	**Budget**	**Due date**		Due within	10-Sep-20	20-Sep-20
2	Tip-Zen	$1,550	3-Sep-20		Total	$11,150	
3	Peak-Energy	$1,600	11-Sep-20				
4	Peak-Blast	$1,700	20-Sep-20				
5	Tip-Row	$2,500	12-Sep-20				
6	Peak-Voice	$2,550	10-Sep-20				
7	Tip-Hog	$2,800	18-Sep-20				
8	Tip-Meet	$2,850	25-Sep-20				
9	Tip-Berry	$3,300	5-Sep-20				
10	Peak-Fibble	$3,500	26-Sep-20				

Getting a count of values that meet a certain condition

The COUNTIF function in Excel is used to enumerate cells that fulfill given criteria or conditions inside a defined range.

For instance, a COUNTIF formula may be used to determine the number of cells in your worksheet that consists of a number that is higher than or lesser than the value you give. COUNTIF is also often used in Excel to count cells that contain a given word or begin with a specific letter (s).

The COUNTIF function has a very basic syntax: **=COUNTIF(range, criteria)**

It has just two arguments which are Range and Criteria. The range here defines one or multiple cells for counting while the Criteria here defines the condition which lets the function of the cell that is needed for counting. You write in the range as you do normally such as B1:B15. You can put in the criteria as "**10", B2, ">=10", "some text"**

Getting a count of values that meet two or more conditions

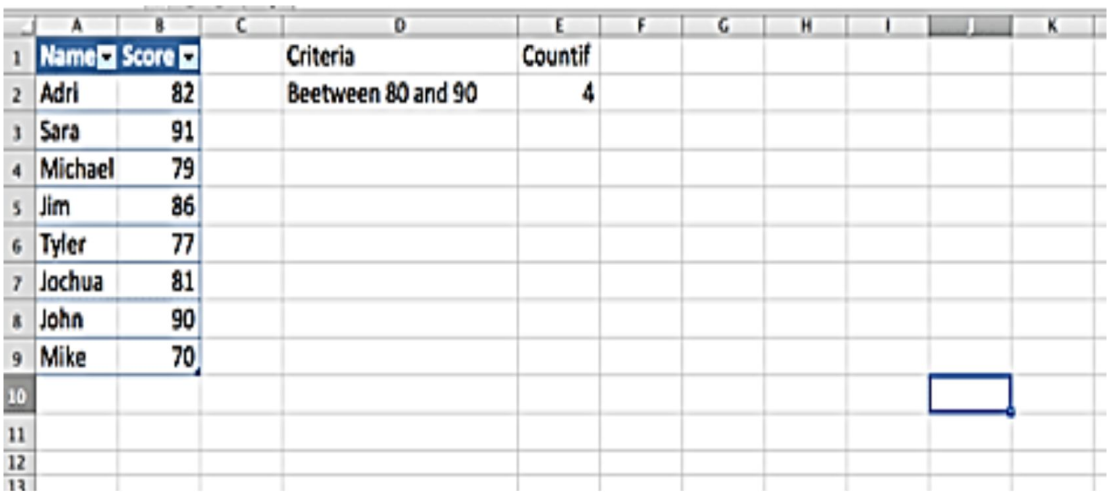
The COUNTIFS function may be used to display the number of cells that satisfy a specified condition. COUNTIF may be used to count items based on dates, numbers, text, and other parameters.

COUNTIFS additionally requires the use of logical expressions (>,>,=).

COUNTIFS is a function that counts cells that satisfy several criteria. Since we provide the same range for two criteria in this situation, each cell in the range must fulfill both requirements to be tallied. The formula is **=COUNTIFS(range,">=X",range,"<=Y").**

- For greater than or equal to, use >=.
- For less than or equal to, use =.

So, if we wish to count depending on conditions in our dataset, we use the following formula: **=COUNTIFS(B2:B9,">=80",B2:B9,"<=90")**



	A	B	C	D	E
1	Name	Score		Criteria	Countif
2	Adri	82		Beetween 80 and 90	4
3	Sara	91			
4	Michael	79			
5	Jim	86			
6	Tyler	77			
7	Jochua	81			
8	John	90			
9	Mike	70			

Finding nonstandard characters

We understand that the TRIM and CLEAN Excel functions should be used to remove non printable characters and excess gaps from strings, but they aren't very helpful in recognizing strings that include nonstandard characters like @ or! We utilize UDFs in these situations.

So you won't be able to tell whether a string includes any special characters using an Excel formula or function. By directly typing, we can discover the special characters on the keyboard, but we can't tell whether the string contains symbols or not

For data cleansing reasons, locating any special characters might be critical. And in certain circumstances, it is unavoidable. So, how do we go about doing this in Excel? What is the best way to tell whether a string includes any nonstandard characters? To accomplish so, we may make use of UDF.

If any cell includes any characters other than 1 to 0 and A to Z, the equation below will yield TRUE (in both cases). It will yield FALSE if no nonstandard characters are found.

The formula is; **=ContainsSpecialCharacters(string)**

Before this formula will work, it has to be placed in the module. So, open up the VBE and insert a module from the Insert Menu. Use the code below in the VBE. Press ALT + F11 to open.

```
Function ContainsSpecialCharacters(str As String) As Boolean
For I = 1 To Len(str)
ch = Mid(str, I, 1)
Select Case ch
  Case "0" To "9", "A" To "Z", "a" To "z", " "
   ContainsSpecialCharacters = False
  Case Else
   ContainsSpecialCharacters = True
  Exit For
End Select
Next
End Function
```

Getting the average of all numbers that meet a certain condition

Excel's AVERAGEIF function computes the average (arithmetic aggregate) of all cells that fulfill a set of conditions. The formula is: **AVERAGEIF(range, criteria, [average_range]).** The first two parameters to the AVERAGEIFS function are necessary, while the final one is optional:

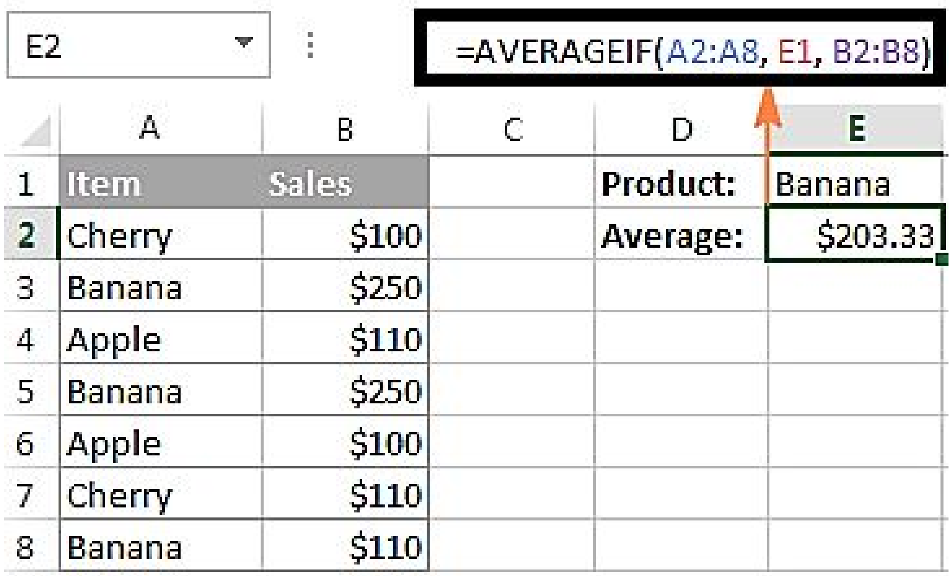
- Range - the number of cells that will be compared to the supplied criteria.

- The criterion used to choose which cells to average is known as the criteria. The criterion may be specified as a number, a logical expression, a text value, or a cell reference, for example, 5, ">5", "cat," or A2.
- Average range - the range of cells to average (optional). If the range parameter is omitted, the formula will compute an average of the values in it.

EXAMPLE:

The AVERAGEIF function in Excel is most often used to obtain an average of cells that perfectly fit a specific requirement. Let's average just the sales (B2:B8) for the Banana orders (A2:A8) in this illustration:

=AVERAGEIF(A2:A8, "banana", B2:B8). You can put the formula in an empty cell. **=AVERAGEIF(A2:A8, E1, B2:B8)**



Getting the average of all numbers that meet two or more conditions.

The AVERAGEIFS function is the plural version of the AVERAGEIF function. It takes many factors into account and provides the average (arithmetic average) of units that match all of the requirements.

The formula is; **AVERAGEIFS(average_range, criteria_range1, criteria1, [criteria_range2, criteria2], …)**

The following are the parameters to the AVERAGEIFS function:

- The average range parameter specifies the range of cells to average.
- Criteria range1, Criteria range2, Criteria range3, Criteria range4, Criteria range5, Criteria range - 1 to 127 ranges to be compared to the set of criteria The first criteria range is necessary; the others are optional.
- Criteria1, criteria2…. means the cell that is to be averaged. It can be provided in a number form, logical expression, cell reference, or text value.

The Excel AVERAGEIFS function, as previously stated, finds the average of cells that fulfill all of the conditions you give (AND logic). In principle, it works similarly to AVERAGEIF, with the exception that you may use it in formulas with multiple criteria ranges and criteria.

CHAPTER SIX

USING FORMULAS FOR MATCHING AND LOOKUPS

Introducing Lookup Formulas

Just like how you open your dictionary to look up the meaning of a word and then find the meaning, that's how the LOOKUP function works. You use this function to retrieve some data by looking it up.

The lookup function is the predecessor and the simpler version of the VLOOKUP function. It looks for a number in a range (which may be a row or column) and produces a LOOKUP from another range at the same spot (single row or single column). The LOOKUP that corresponds to the data being examined is a collection of data.

The formula is: **=lookup(lookup_value, lookup_vector, [result_vector]).** The Lookup value stands for the data value you want to look up for. The Lookup vector stands for the row or column where the value is to be searched. You should sort this out alphabetically or rather in ascending order. It will help you get an accurate result.

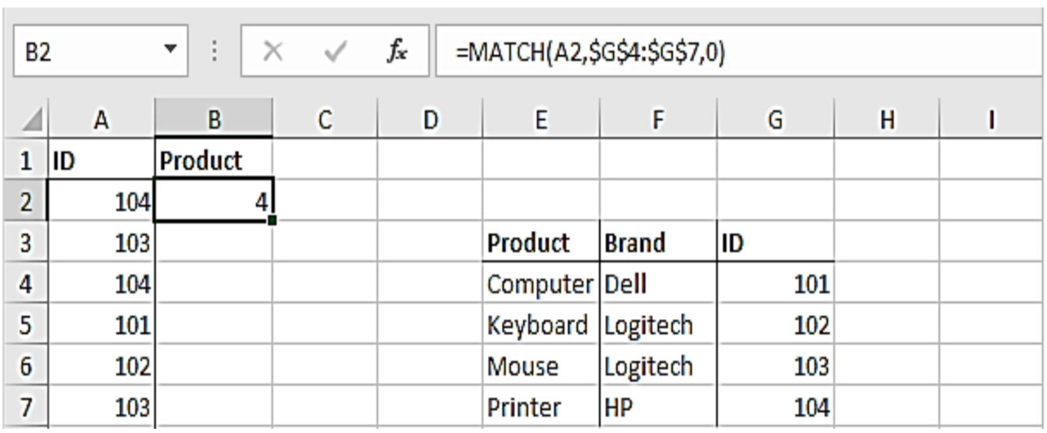
Leveraging Excel's Lookup Functions

Excel consists of many Lookup functions. The functions and their descriptions are listed below;

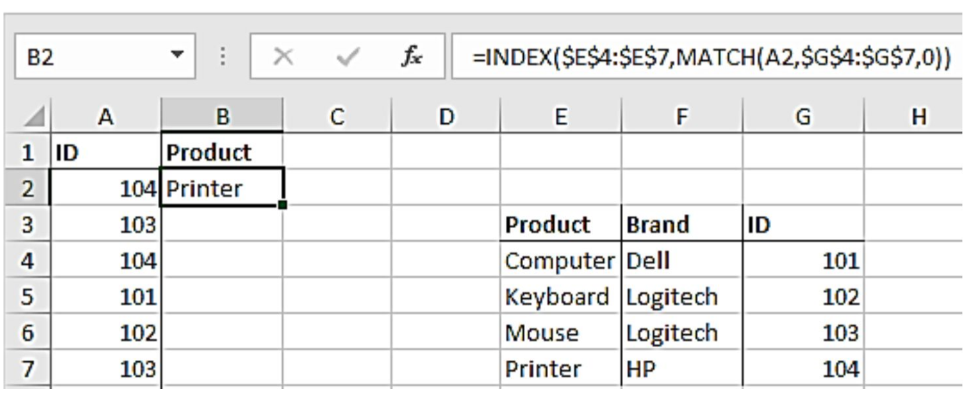
`CHOOSE(num,value1[,value2,...])`	Uses *num* to select one of the list of arguments given by `value1`, `value2`, and so on.
`GETPIVOTDATA(data,table,field1,item1,...)`	Extracts data from a PivotTable. (See Chapter 14, "Analyzing Data with PivotTables.")
`HLOOKUP(value,table,row[,range])`	Searches for `value` in `table` and returns the value in the specified `row`.
`INDEX(ref,row[,col][,area])`	Looks in `ref` and returns the value of the cell at the intersection of `row` and, optionally, `col`.
`LOOKUP(lookup_value, array)`	Looks up a value in a range or array.
`MATCH(value,range[,match_type])`	Searches `range` for `value` and, if found, returns the relative position of `value` in `range`.
`RTD(progID,server,topic1[,topic2,...])`	Retrieves data in real time from an automation server (not covered in this book).
`VLOOKUP(value,table,col[,range])`	Searches for `value` in `table` and returns the value in the specified `col`.

Looking up an exact value based on a left lookup column

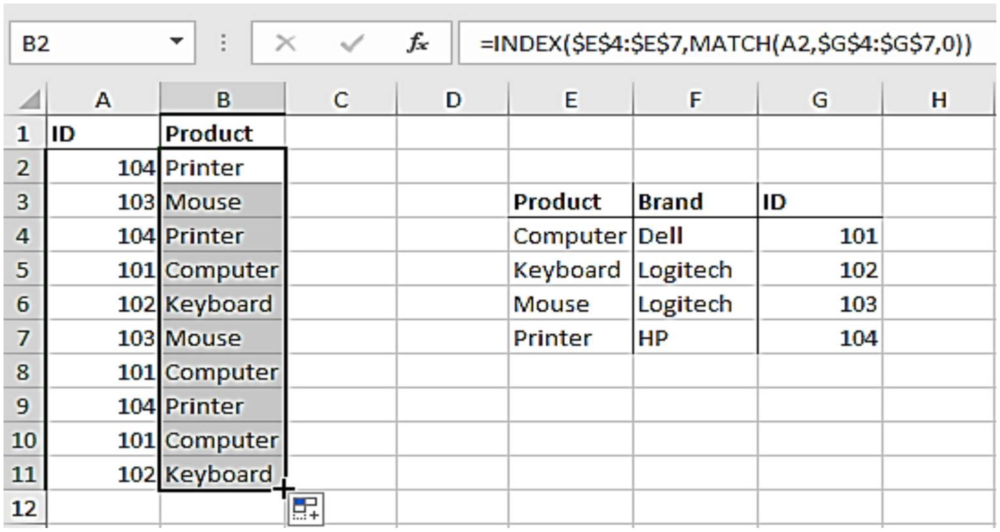
To do this, we will utilize the INDEX and Match function. The MATCH function will display the position of the value in a particular range.



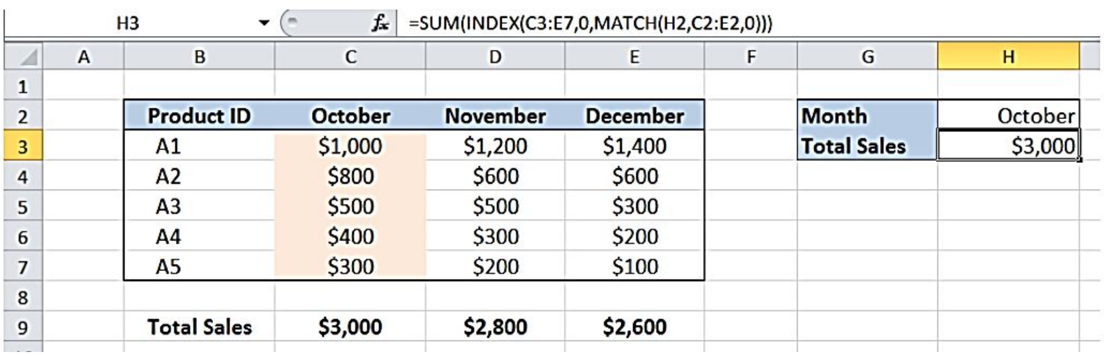
The 104 is seen at position 4 in the range $G$4:$G$7. With the result with the INDEX function, you can display the 4th value in the range $E$4:$E$7.



Use the fill handle to fill in cell B2.



Looking up an exact value based on any lookup column



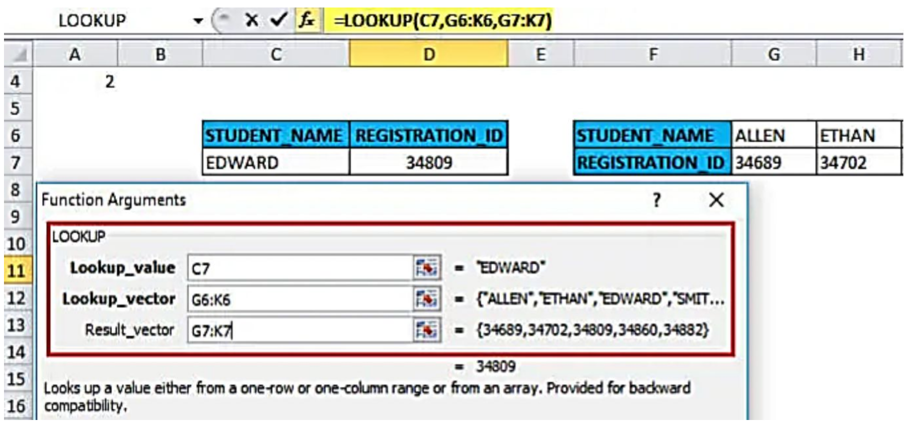
Pick the cell. Then, put in this formula; =SUM(INDEX(C3:E7,0,MATCH(H2,C2:E2,0))). Here, I selected cell H3. Press Enter.

- The array consists of the data for Sales (which is the range).
- The row is set to “0” to Lookup the whole column.
- The MATCH function is to decide the number of the column.
- The result displayed in cell H3 is $3,000. It is the overall sales in October.

Looking up values horizontally

If the items in your data sources seem to be in rows rather than columns, this is a horizontal arrangement.

The student name and registration id are organized horizontally in rows in this table array. To get the desired outcome, we must choose the row range for both.



The Lookup value means the value that is to be searched for. The Lookup vector means the range that consists of one row of text. In my scenario, it is “G6:K6”. It is organized horizontally. The Result vector is the one-row range which is where the result will be provided. In my scenario, it is “G7:K7”.

There are things you need to consider when applying this vector Lookup.

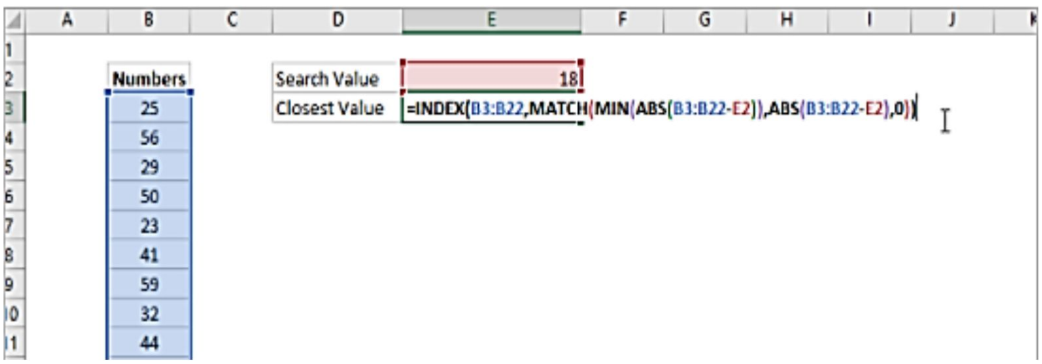
- The Lookup formula might produce errors or an inaccurate result if the values in the lookup vector are not ordered in alphabetically or ascending order, i.e. from biggest to smallest in numeric values or from A to Z in text.
- The Lookup vector and the Result vector must both be a one-row or one-column range of the same size.
- The LOOKUP function does not distinguish between lowercase and uppercase text because it is not case-sensitive. Uppercase and lowercase characters are regarded as interchangeable.
- The Lookup algorithm looks for a precise match. The LOOKUP Function returns the #N/A error if the lookup value does not locate

the appropriate value in the lookup vector.

FINDING THE CLOSEST MATCH FROM A LIST OF BANDED VALUES

Finding the closest match with INDEX and MATCH functions

In my table below, I have a number list in the A column. I want to find the closest value of 18 in Column A. To do this, first choose a cell, enter this formula; =INDEX(B3:B22,MATCH(MIN(ABS(B3:B22-E2)),ABS(B3:B22-E2),0)).



Press Enter.

Looking up values from multiple tables

Put in an empty cell, the value that you want to look up. Enter in the formula in the adjacent cell;

=IF(ISERROR(INDEX($A$1:$B$7,SMALL(IF($A$1:$A$7=$D$4,ROW($A$1:$A$7)),ROW(1:1)),2)),"",

INDEX($A$1:$B$7,SMALL(IF($A$1:$A$7=$D$4,ROW($A$1:$A$7)),ROW(1:1)),2))

	A	B	C	D	E
1	Name	Score			
2	Alish	442			
3	Alish	313			
4	Pore	123		Alish	442
5	Rajge	323			313
6	Alish	232			232
7	Sue	142			

Press **Shift + Control + Enter**. Use the fill handle to fill other cells.

In this formula, $A$1:$B$7 means the data range. $A$1:$A$7 means the column range for the lookup. $D$4 stands for the cell in which you type the lookup value.

Looking up a value based on a two-way matrix

Once you search for a variable at the intersection matching the specified row and column variables, you'll utilize a two-way lookup. For example, suppose you have a table with several rows and column headings, and the value you're looking for is the intersection of column 5-Jan and row AA-3, as seen in the picture below.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Product	1-Jan	2-Jan	3-Jan	4-Jan	5-Jan	6-Jan	7-Jan	8-Jan		Product	AA-3
2	AA-1	124	129	105	109	114	131	138	116		Date	5-Jan
3	AA-2	134	113	147	102	114	119	119	127		Value	146
4	AA-3	123	128	101	150	146	113	111	150			
5	AA-4	103	114	127	109	111	119	108	126			
6	AA-5	104	129	133	149	140	134	149	109			
7	AA-6	135	113	110	128	136	103	115	102			
8	AA-7	140	124	140	140	105	142	102	111			
9												

Follow these steps to do so;

List out the headers of the row and the column for the lookup.

	A	B	C	D	E	F	G	H	I	J	K	L
1	Product	1-Jan	2-Jan	3-Jan	4-Jan	5-Jan	6-Jan	7-Jan	8-Jan		Product	AA-3
2	AA-1	124	129	105	109	114	131	138	116		Date	5-Jan
3	AA-2	134	113	147	102	114	119	119	127		Value	
4	AA-3	123	128	101	150	146	113	111	150			
5	AA-4	103	114	127	109	111	119	108	126			
6	AA-5	104	129	133	149	140	134	149	109			
7	AA-6	135	113	110	128	136	103	115	102			

Move to the cell where you want to display the lookup value. You can use any of the formulas below.

- =INDEX(A1:I8,MATCH(L1,A1:A8,0),MATCH(L2,A1:I1,0))
- =SUMPRODUCT((A1:A8=L1)*(A1:I1=L2),A1:I8)
- =VLOOKUP(L1,$A$1:$I$8,MATCH(L2,B1:I1,0)+1,FALSE)
- Press Enter.

A1:A8 means the column range. The header of the row is L1 and the header of the column is L2. A1:L1 means the row range.

The 2nd formula will display 0 when the lookup value is in the form of a text.

Finding a value based on multiple criteria

If you got a fruit sales table like the one below, you'll need to calculate the amount depending on numerous factors. This approach will provide various array formulae that will make it simple to locate values depending on the supplied criteria. This will be done using the Array formula.

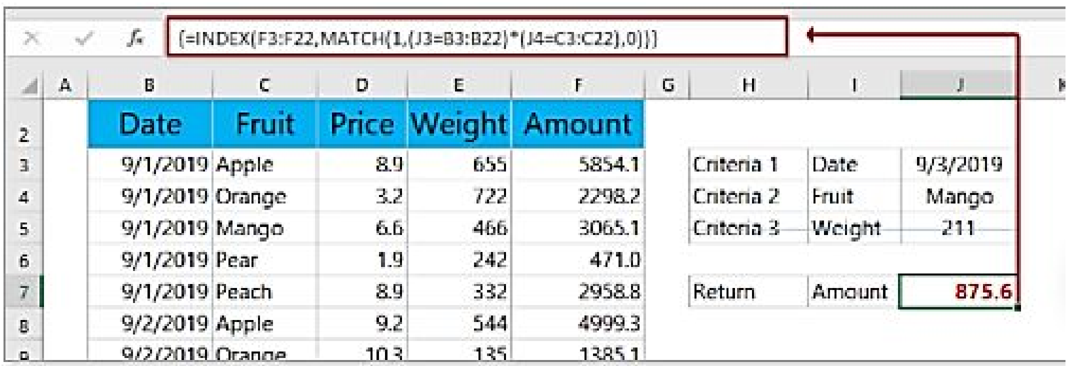
	A	B	C	D	E	F
1						
2		Date	Fruit	Price	Weight	Amount
3		9/1/2019	Apple	8.9	655	5854.1
4		9/1/2019	Orange	3.2	722	2298.2
5		9/1/2019	Mango	6.6	466	3065.1
6		9/1/2019	Pear	1.9	242	471.0
7		9/1/2019	Peach	8.9	332	2958.8
8		9/2/2019	Apple	9.2	544	4999.3
9		9/2/2019	Orange	10.3	135	1385.1
10		9/2/2019	Mango	4.5	173	775.2
11		9/2/2019	Pear	8.9	621	5525.4
12		9/2/2019	Peach	5.1	157	800.4
13		9/3/2019	Apple	5.1	655	3313.7
14		9/3/2019	Orange	7.3	427	3111.3
15		9/3/2019	Mango	3.1	211	875.6
16		9/3/2019	Pear	5.0	743	3734.6
17		9/3/2019	Peach	3.8	241	921.9
18		9/3/2019	Apple	7.4	673	4955.0
19		9/4/2019	Orange	1.4	211	294.0
20		9/4/2019	Mango	9.6	795	7603.7
21		9/4/2019	Pear	6.8	288	1969.0
22		9/4/2019	Peach	7.4	795	5871.3

	G	H	I	J
3		Criteria 1	Date	9/3/2019
4		Criteria 2	Fruit	Mango
5		Criteria 3	Weight	211
7		Return	Amount	???

The basic statement for this formula is: {=INDEX(array,MATCH(1,(criteria 1=lookup_array 1)*(criteria 2= lookup_array 2)…*(criteria n= lookup_array n),0))}.

To find the number of sales of Mango which occurs 9/3/2022, simply put in the formula below. After that, press Control + Shift + Enter.

=INDEX(F3:F22,MATCH(1,(J3=B3:B22)*(J4=C3:C22),0)).

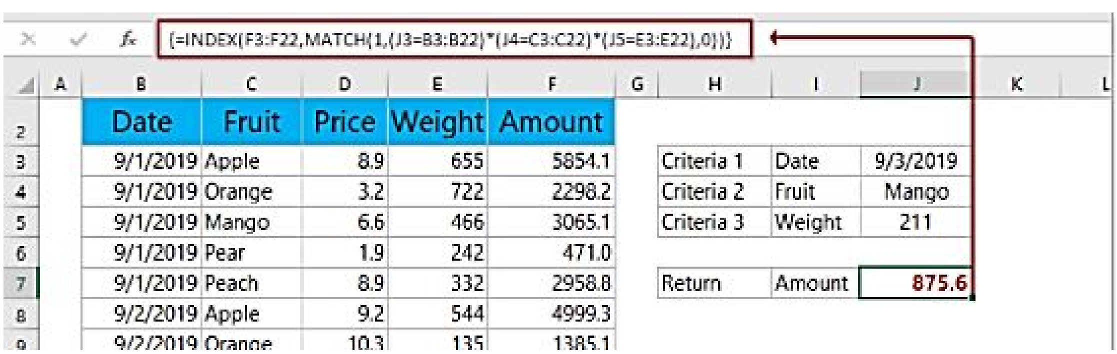


{=INDEX(F3:F22,MATCH(1,(J3=B3:B22)*(J4=C3:C22),0))}

Date	Fruit	Price	Weight	Amount				
9/1/2019	Apple	8.9	655	5854.1		Criteria 1	Date	9/3/2019
9/1/2019	Orange	3.2	722	2298.2		Criteria 2	Fruit	Mango
9/1/2019	Mango	6.6	466	3065.1		Criteria 3	Weight	211
9/1/2019	Pear	1.9	242	471.0				
9/1/2019	Peach	8.9	332	2958.8		Return	Amount	875.6
9/2/2019	Apple	9.2	544	4999.3				
9/2/2019	Orange	10.3	135	1385.1				

You may simply add criteria as needed using the array formula statement. For example, if you're searching for the mango sales amount on 9/3/2022 and the mango weighing 211, you may use the MATCH section to enter the criterion and lookup array as described in the following:

=INDEX(F3:F22,MATCH(1,(J3=B3:B22)*(J4=C3:C22)*(J5=E3:E22),0)). Press Control + Shift + Enter.

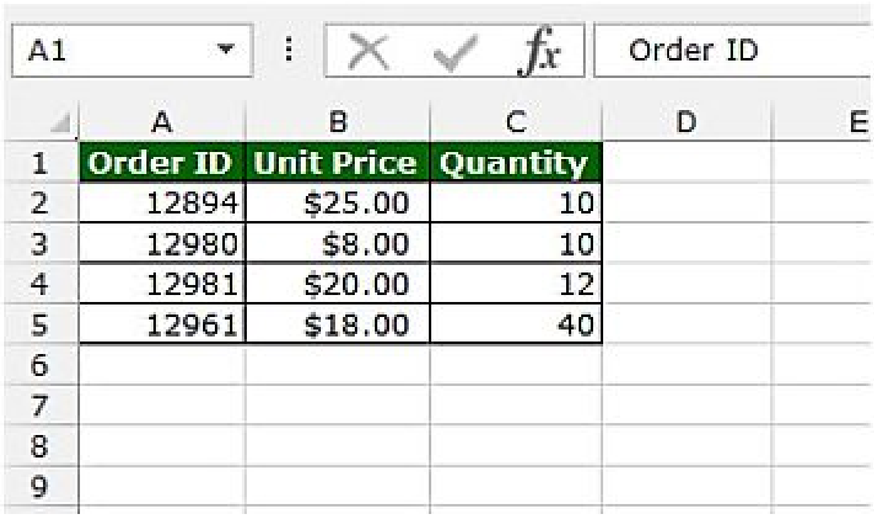


{=INDEX(F3:F22,MATCH(1,(J3=B3:B22)*(J4=C3:C22)*(J5=E3:E22),0))}

Date	Fruit	Price	Weight	Amount				
9/1/2019	Apple	8.9	655	5854.1		Criteria 1	Date	9/3/2019
9/1/2019	Orange	3.2	722	2298.2		Criteria 2	Fruit	Mango
9/1/2019	Mango	6.6	466	3065.1		Criteria 3	Weight	211
9/1/2019	Pear	1.9	242	471.0				
9/1/2019	Peach	8.9	332	2958.8		Return	Amount	875.6
9/2/2019	Apple	9.2	544	4999.3				
9/2/2019	Orange	10.3	135	1385.1				

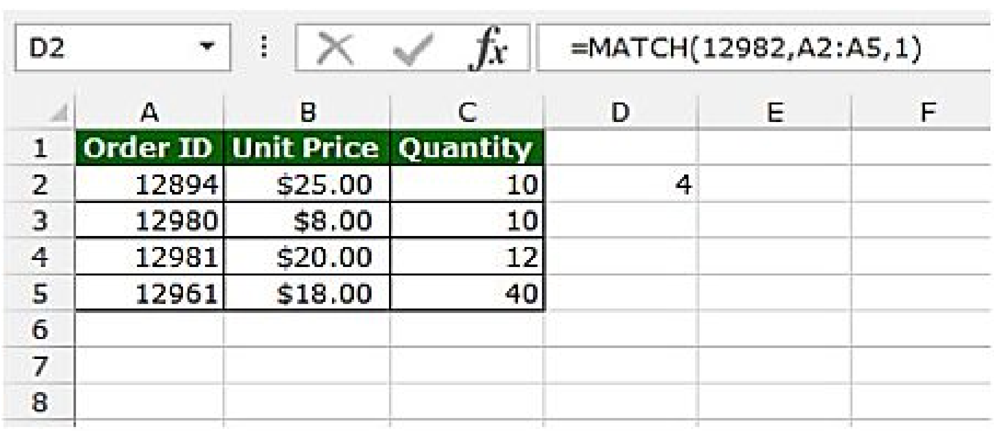
Finding the last value in a column

This will be achieved using the MATCH formula. The syntax of the formula is =MATCH(lookup_value,lookup_array,[match_type]). In my data below, we have values in the range A1:C5. Column A consists of an Order ID, Column B consists of Unit Price, and Column C consists of Quantity. We are to get the last value in the column using the steps below;



	A	B	C	D	E
1	Order ID	Unit Price	Quantity		
2	12894	$25.00	10		
3	12980	$8.00	10		
4	12981	$20.00	12		
5	12961	$18.00	40		
6					
7					
8					
9					

Put this formula in cell D2. =MATCH(12982,A2:A5,1). Press Enter. This will display 4. 4 here stands for the 4th cell which matches the given criterion.



	A	B	C	D	E	F
1	Order ID	Unit Price	Quantity			
2	12894	$25.00	10	4		
3	12980	$8.00	10			
4	12981	$20.00	12			
5	12961	$18.00	40			
6						
7						
8						

Finding the last number using LOOKUP.

The formula for this is =MATCH(LOOKUP(ANY VAGUE NUMBER,1/(ROW: ROW<>”), ROW: ROW), ROW: ROW,0)

First, click the cell where the value is to be displayed. For our example, put in this formula =MATCH(LOOKUP(3512,1/(2:2<>””),2:2),2:2,0). This will display the column number of the last number/cell that contains the data in row number 2.

Press **Enter**.

CHAPTER SEVEN

USING FORMULAS FOR FINANCIAL ANALYSIS

Performing common business calculations

A financial feature in Excel, in essence, performs a standard company calculation that involves money. Calculating interest payments, calculating the income and capital part of a loan, and computing different elements of depreciation are all examples of this. The determined value is then used to make decisions.

Calculating gross profit margin and gross profit margin percent

Profit margin percentage calculation

Item	Price	Cost	Profit Margin
A	$5.00	$4.00	20%
B	$9.95	$7.50	25%
C	$49.00	$37.00	24%
D	$69.95	$55.00	21%
E	$100.00	$82.50	18%
F	$119.00	$71.00	40%
G	$495.00	$410.00	17%
H	$1,995.00	$1,750.00	12%
I	$19,500.00	$18,500.00	5%
J	$30,000.00	$27,000.00	10%
K	$100,000.00	$87,000.00	13%

The formula for doing this is **=(price-cost)/price**. You will minus the cost of the products from the price. Then, you will divide by the price. Here, I worked with **=(C5-D5)/C5** on cell E5. Your result may show in decimal values but you can change the format to percentage.

Explanation: the main thing in this example is to compute and show the profit margin as a percentage for the products in the table. Each of the products here has its price and cost and this means that they all have different profits. To find the profit margin, use this formula X = Profit/Price. For-profit, Price – Cost.

Calculating markup

The profit margin your company earns from products and operations is known as markup. To compute markup on materials from wholesale to retail price or on products & services from supplier price to customer price, you can save time and ensure reliability by using Microsoft Excel. You may test "what-if" situations by varying your markup percentage if you format your spreadsheet content for optimum versatility.

Steps in doing so:

1. Make separate columns for the expenses you would like to mark up, the markup %, and the calculation's outcomes. The calculation column should be left empty.
2. On the column that consists of the cost value, click on its heading. On the Home tab, click on the little arrow at the bottom right corner of the Number Group.
3. On the Format Cell box, choose the decimal places for your number values in the cost column. If you want a lengthier value, make it to two decimal places. Select OK.
4. Choose the column where the markup percentage will be displayed. Also, use the same steps above to format the numbers to their decimal places.
5. To choose your calculation column, hit the column header. Choose the "Currency" format in the Format Cells dialog box to see your findings preceded by dollar signs or other currency indicators. To show a comma in numbers bigger than 999.99, enable the thousands divider.
6. Fill in the relevant column with your expenses. Type the number in the first cell of the markup column and hit "Enter" to confirm the value if your markup % is the same for all cost kinds and categories. Use the fill handle to fill in other cells in regards to the cost column.

7. Select the first cell in the calculation column. Press "Enter" after typing the following formula, substituting the templates with the necessary cell references. **=[first cell of cost column] + ([first cell of cost column] * [first cell of markup column])**
8. Your cost might display in column A while your markup percentage is displayed in Column B. Then, your formula will provide this result: =A1 + (A1 * B1).
9. Finally, on the cell that consists of your calculation, use the fill handle to fill in the cells.

Calculating EBIT and EBITDA

EBITDA: Earnings before Interest, Tax, and Depreciation and Amortization. It is the net income plus the interest, D&A, and Tax included back to net income. This is mostly used to calculate and determine the difference between the profit of two or more companies. The formula for this is Income + Interest + Taxes + Depreciation & Amortization. It is obtained by getting the total income, then minus it from the total expenses without the interest, Tax, and D & A.

EBIT: Earnings before Interest and Tax. You compute the net income before computing the interest and income tax. The formula is Net Income + Interest +Taxes.

Calculating cost of goods sold

The expenses of obtaining or producing items to be sold by a corporation over a certain period are referred to as the cost of goods sold (COGS).

It only comprises expenses paid explicitly in the production of the items, such as labor, raw materials, and overhead expenditures linked to the production of commodities to be sold.

When calculating COGS, indirect costs like marketing and sales expenditures, shipping, legal charges, taxes, licensing, and so on are not taken into account.

As a result, COGS is determined by adding starting inventory and any extra expenditures made during the year, then deducting closing inventory from the total opening inventory and further purchases.

The unsold inventory after the preceding fiscal year is known as beginning inventory. The closing inventory, on the other hand, is the unsold inventory after the present fiscal year.

The cost of goods sold, also known as Cost of Sales, is an essential item on your firm's income statement since it helps determine Gross Margin, a performance indicator that shows how well your company manages raw materials and manpower.

Example: A company named B has a beginning inventory of $40000. So, they bought raw materials. They made use of labor to manufacture their goods. Their total value for everything is $10000. So, the ending inventory for them at the end of the year is $30000.

To calculate the cost of goods sold here, we will apply this formula; Cost of Goods Sold = Beginning Inventory + Purchases during the year – Ending Inventory. So we do,

$40000 + $10000 - $30000 = $20000

The cost of goods sold is $20000.

Calculating return on assets

In financial ratios, return on assets (ROA) is used to measure a company's financial performance in proportion to its total assets. Divide a company's net income by its total assets to get its ROA. To assess a company's efficiency in producing profits utilizing its assets, the ROA calculation may also be computed using Microsoft Excel. We'll show you how to do this computation in Excel.

Key points

- Return on assets (ROA) is a measure of a company's profitability concerning the resources and assets it controls.
- ROA may help investors uncover potential stock chances since it measures how well a business uses its assets to produce profits.

- Excel is a fantastic tool for quickly calculating a firm's ROA and contrasting it to its rivals.

The formula is = Net Income / Total Assets.

For example: in the year 2015, Netflix announced that they got over $23,696,000 in their net income. Also, they had total assets of $9,240,626,000. Now, let’s find the return on assets for Netflix.

To calculate this, simply divide the net income with the total asset which is 23,696,000/9,240,626,000 = 0.0026 or 0.26%.

Calculating return on equity

In financial accounting, the return on equity, or ROE, is used to determine a firm’s performance. The ROE formula calculates the amount of net income generated by a corporation using its shareholders' equity. The return on investment (ROI) may be used to evaluate the profitability of one business to that of another in the same industry.

Keywords

- Analysts use return on equity, or ROE, as a metric to evaluate a firm’s competitiveness.
- The return on investment (ROI) is a helpful metric for comparing the profitability of two rivals in the same industry.

The formula for this is the **Net Income/Shareholder’s equity**.

Calculating break-even

Break-even analysis is the study of how many sales, or units sold, are needed to break even when all fixed and variable expenses of operating a firm are included in. Because estimates about expenses and future revenues decide whether a firm (or project) is on schedule to profitability, break-even analysis is essential for any business development and financial analysis.

Fixed and variable costs are the two types of expenses considered in break-even analysis. Fixed expenses stay relatively constant regardless of the number of units sold, but variable costs fluctuate with the number of units sold. Inventory of raw materials used in manufacturing are examples of variable costs. The rent for the producing facility would be a fixed expense. Break-even analysis assists businesses in determining how many units must be sold to pay their variable expenses as well as the percentage of their fixed costs associated with manufacturing that unit.

The formula for break-even

When the following conditions are met, the break-even point is reached:

Revenue = Total Fixed Costs + Total Variable Costs

The **total fixed costs**, which include items like rent, salary, utilities, interest expenditure, depreciation, and amortization, are typically known.

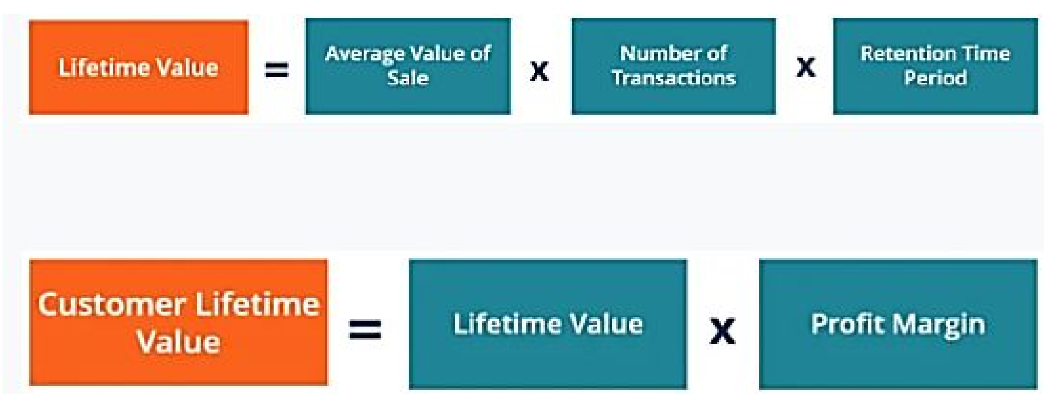
Total variable costs are more difficult to estimate, however they include items such as material cost, chargeable labor, incentives, and fees.

Unit Price * Number of Sold Units = **Revenue**

Calculating the average customer lifetime value

Customer lifetime value (LTV), often called lifetime value, is the total income a firm anticipates to generate from a single customer throughout their relationship. Client recruiting costs, operational expenditures, and costs to create the products or services that the firm produces are all included in the customer lifetime value estimate. Many businesses underestimate the LTV measure, although client lifetime value is critical to a business's success.

The formula is as follows:



How do you figure out a company's LTV?

The average purchase value is computed by dividing the industry's total income over a certain period by the entire sales made by its consumers within that particular period.

The overall items purchased over a duration of time by the individual consumers who made such purchases during that time are used to determine the average purchase frequency rate.

Customer value is determined by multiplying the average transaction value by the number of times the transaction has been made.

Average customer lifetime - This is the mean number of years that a client maintains its purchase of products and services from a firm.

Calculation of lifetime value - The LTV is computed by multiplying the customer's worth to the firm by their typical lifespan. It helps a corporation in determining how much money they may anticipate from a client throughout their partnership.

Calculating employee turnover

Employee turnover is calculated by taking the number of employees that leave an organization and dividing it by the total number of employees that are typically carried on the payroll. To make that number relevant you want to be able to put it within a time frame.

Typically, when we talk about employee turnover, we talk about it on an annual basis. To come up with an annual turnover, you want to take the number of employees that left the organization over an entire year and divide it by the average number of employees that you carry over the year.

The first step would be to go back over the last 12-month period in the last calendar year and figure out how many employees you carried each month.

One way of doing that is just to take a particular payday each month. Let’s say the first Friday of the month or the first pay period of the month and count the number of paychecks that went out.

Turnover is important because it's a good indicator of how good a job was

of recruiting the right people, selecting and hiring the right people, how good our training programs are, and how good a job we're doing of creating a culture that makes the right people want to stay and be committed and be productive and longtime employees in your workforce.

You constantly want to be developing new programs and implementing new approaches to keep that number as low as you can

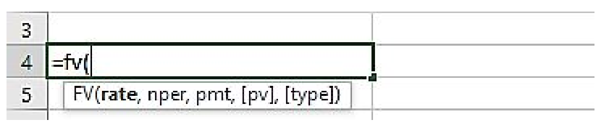
Leveraging Excel's Financial functions

Excel has lots of financial functions. People use these functions to calculate their day-to-day activities in their company or firm. Some of the functions are Future Value (FV), FVSCHEDULE, Present Value (PV), XNPV, PPMT, and lots more. Below are some of the ways you can utilize these functions in Excel.

CONVERTING INTEREST RATES

Computing effective rate with FV

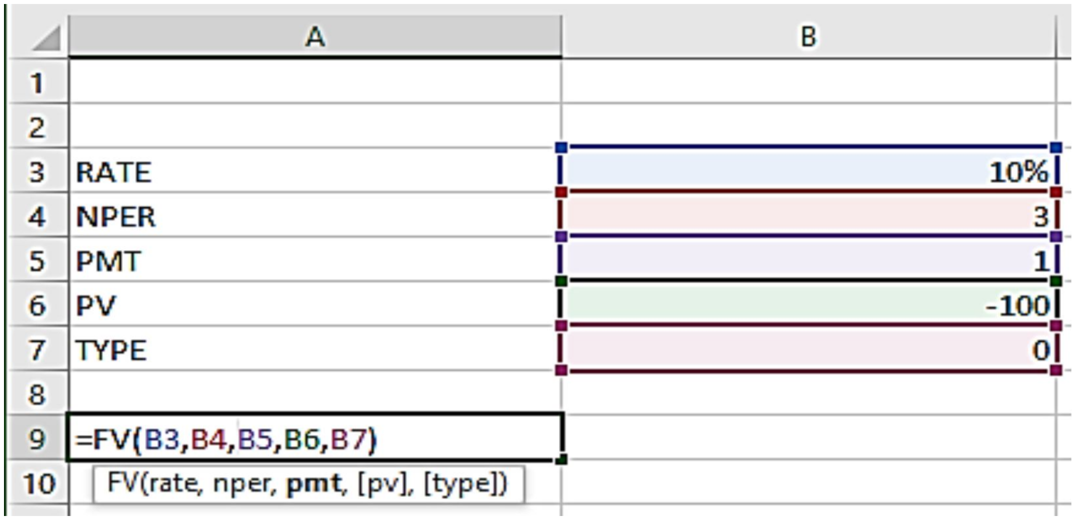
The Function Value (FV) is used to discover the future value of an investment. It contains the interest rate that doesn't change and the payment made periodically. To, do this, the formula below is used;



Rate here means the interest rate or the period. **Nper** means the number of periods.

[Pmt] means the payment period. **PV** means the Present Value. [**Type**] means when the payment is made. In this [type] option, when something is attached to it, it means that the payment was made at the period end.

Example: Apple invested $100 in 2017 and this payment has been made yearly. They have an interest of 10% per annum. What would be their future value in 2021?

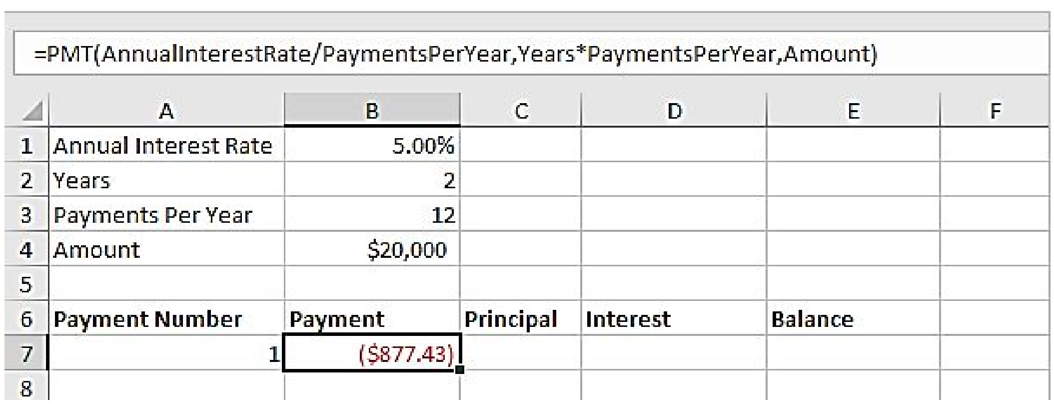


	A	B
1		
2		
3	RATE	10%
4	NPER	3
5	PMT	1
6	PV	-100
7	TYPE	0
8		
9	=FV(B3,B4,B5,B6,B7)	
10	FV(rate, nper, **pmt**, [pv], [type])	

You will get the US $129.79

Creating an amortization schedule

This is done using the PMT function. We use it to compute the payment made monthly on a loan. It has an interest rate of 5%, a duration of two years, and a present value of $20000. Named ranges are used for the input cells.



=PMT(AnnualInterestRate/PaymentsPerYear,Years*PaymentsPerYear,Amount)

	A	B	C	D	E	F
1	Annual Interest Rate	5.00%				
2	Years	2				
3	Payments Per Year	12				
4	Amount	$20,000				
5						
6	**Payment Number**	**Payment**	**Principal**	**Interest**	**Balance**	
7	1	($877.43)				
8						

With the PPMT function, compute the principal part of the payment.

=PPMT(AnnualInterestRate/PaymentsPerYear,A7,Years*PaymentsPerYear,Amount)

	A	B	C	D	E	F
1	Annual Interest Rate	5.00%				
2	Years	2				
3	Payments Per Year	12				
4	Amount	$20,000				
5						
6	**Payment Number**	**Payment**	**Principal**	**Interest**	**Balance**	
7	1	($877.43)	($794.09)			
8						

Then, using the IPMT function, compute the payment with the interesting part.

=IPMT(AnnualInterestRate/PaymentsPerYear,A7,Years*PaymentsPerYear,Amount)

	A	B	C	D	E	F
1	Annual Interest Rate	5.00%				
2	Years	2				
3	Payments Per Year	12				
4	Amount	$20,000				
5						
6	**Payment Number**	**Payment**	**Principal**	**Interest**	**Balance**	
7	1	($877.43)	($794.09)	($83.33)		
8						

Fill in the balance.

=Amount+C7

	A	B	C	D	E	F
1	Annual Interest Rate	5.00%				
2	Years	2				
3	Payments Per Year	12				
4	Amount	$20,000				
5						
6	**Payment Number**	**Payment**	**Principal**	**Interest**	**Balance**	
7	1	($877.43)	($794.09)	($83.33)	$19,205.91	
8						

Pick range A7:E7. Then drag it down one row. Modify the balance formula.

=E7+C8

	A	B	C	D	E	F
1	Annual Interest Rate	5.00%				
2	Years	2				
3	Payments Per Year	12				
4	Amount	$20,000				
5						
6	**Payment Number**	**Payment**	**Principal**	**Interest**	**Balance**	
7	1	($877.43)	($794.09)	($83.33)	$19,205.91	
8	2	($877.43)	($797.40)	($80.02)	$18,408.50	
9						

Pick range A8:E8. Drag it down to row 30.

	A	B	C	D	E	F
1	Annual Interest Rate	5.00%				
2	Years	2				
3	Payments Per Year	12				
4	Amount	$20,000				
5						
6	**Payment Number**	**Payment**	**Principal**	**Interest**	**Balance**	
7	1	($877.43)	($794.09)	($83.33)	$19,205.91	
8	2	($877.43)	($797.40)	($80.02)	$18,408.50	
9	3	($877.43)	($800.73)	($76.70)	$17,607.78	
10	4	($877.43)	($804.06)	($73.37)	$16,803.71	
11	5	($877.43)	($807.41)	($70.02)	$15,996.30	
12	6	($877.43)	($810.78)	($66.65)	$15,185.53	
13	7	($877.43)	($814.15)	($63.27)	$14,371.37	
14	8	($877.43)	($817.55)	($59.88)	$13,553.82	
15	9	($877.43)	($820.95)	($56.47)	$12,732.87	
16	10	($877.43)	($824.37)	($53.05)	$11,908.50	
17	11	($877.43)	($827.81)	($49.62)	$11,080.69	
18	12	($877.43)	($831.26)	($46.17)	$10,249.43	
19	13	($877.43)	($834.72)	($42.71)	$9,414.71	
20	14	($877.43)	($838.20)	($39.23)	$8,576.51	
21	15	($877.43)	($841.69)	($35.74)	$7,734.81	
22	16	($877.43)	($845.20)	($32.23)	$6,889.62	
23	17	($877.43)	($848.72)	($28.71)	$6,040.89	
24	18	($877.43)	($852.26)	($25.17)	$5,188.64	
25	19	($877.43)	($855.81)	($21.62)	$4,332.83	
26	20	($877.43)	($859.37)	($18.05)	$3,473.45	
27	21	($877.43)	($862.96)	($14.47)	$2,610.50	
28	22	($877.43)	($866.55)	($10.88)	$1,743.95	
29	23	($877.43)	($870.16)	($7.27)	$873.79	
30	24	($877.43)	($873.79)	($3.64)	($0.00)	
31						

CALCULATING DEPRECIATION

Calculating accelerated depreciation

Accelerated depreciation is a form of depreciation whereby a capital asset's purchase price is reduced at a quicker (accelerated) pace than it would be using typical straight-line depreciation like the straight-line approach. As a result of accelerated depreciation, an investment's value is reduced more quickly in the early years than in the later years. Accelerated depreciation is a common tax-saving approach.

The twofold decreasing balance technique and the summation of the years' figures approach are the most prominent accelerated depreciation methods. The following is the formula for computing depreciation using each of these methods:

1. Depreciation method with a double falling balance: Depreciation method with a dual declining balance = 2 x Straight-line depreciation rate x Book value at the start of the year

2. The way of adding the digits of the years:

Applicable percentage (percent) = Number of anticipated years of life left at the start of the year / SYD

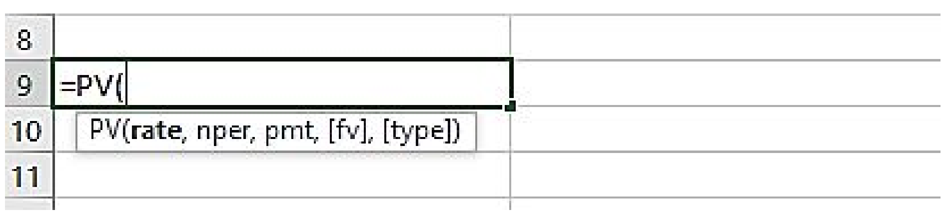
Where:

SYD = n(n+1) / 2

SYD means the sum of the years' digits, where n is the number of years.

Calculating the net present value

This is done using the Present Value function. It is easier to calculate the present value if you can calculate the future value.



Example: The FV of investment in Canada is $100 in 2017. They make the payment yearly with an interest rate of 10% per annum. Calculate the present value?

	A	B	C	D
1				
2				
3	RATE	10%		
4	NPER	3		
5	PMT	1		
6	FV	-100		
7	TYPE	0		
8				
9	=PV(B3,B4,B5,B6,B7			
10	PV(rate, nper, pmt, [fv], **[type]**)			

You will have $72.64

Calculating the positive and negative cash flows

This is done using the Net Present Value (NPV). It is the total sum of the positive and negative cash flows over years.

10		
11	=NPV(	
12	NPV(**rate**, value1, [value2], ...)	
13		

Rate means the discount rate for some time. The Values mean the positive or negative cash flows. Negative values are seen as payments while positive values are seen as inflows.

Example: You will get $240.87.

	A	B	C	D	E
1					
2		Details	In US $		
3		Rate of Discount	5%		
4		Initial Investment	-1000		
5		Return from 1st year	300		
6		Return from 2nd year	400		
7		Return from 3rd year	400		
8		Return from 4th year	300		
9					
10		=NPV(C3,C5:C8)+C4			

CALCULATING AN INTERNAL RATE OF RETURN

Internal Rate of Return (IRR) is an abbreviation for Internal Rate Of Return. The concept NPV, or Net Present Value, is used to describe it. This IRR is defined as the depreciation rate that brings the net present value (NPV) among all working capital (both positive and negative) out of a business or operation to 0.

It's a crucial financial instrument for determining the viability of a new project or venture. A greater IRR than that of the firm's own appropriate pace suggests that the particular investment will likely pay off in the future. The lower IRR, on the other hand, implies a bad return on investment.

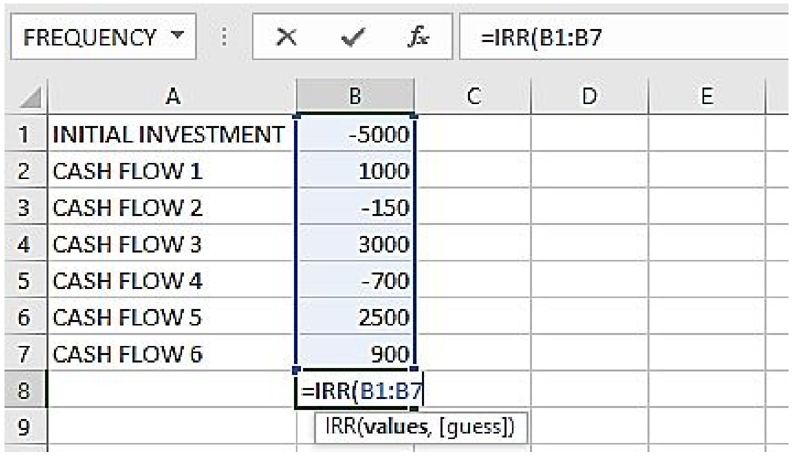
The formula for the internal rate of return is IRR (value1, value2,...). Value one means the initial payment. Now, let’s solve some problems. Below is a table that consists of different cash flows for many periods that differ. The main investment for this business was $5000. This means that the cash flow from day 0 is -5000. Because of this, it is seen as negative cash flow. With the data in this table, we will compute the Internal Rate of Return.

	Cash Flows
Period 0 (Initial Investment)	-5000
Period 1	1000
Period 2	-150
Period 3	3000
Period 4	-700
Period 5	2500
Period 6	900

Now, input your data in your Excel worksheet.

	A	B	C	D	E	F	G
1	INITIAL INVESTMENT	-5000					
2	CASH FLOW 1	1000					
3	CASH FLOW 2	-150					
4	CASH FLOW 3	3000					
5	CASH FLOW 4	-700					
6	CASH FLOW 5	2500					
7	CASH FLOW 6	900					

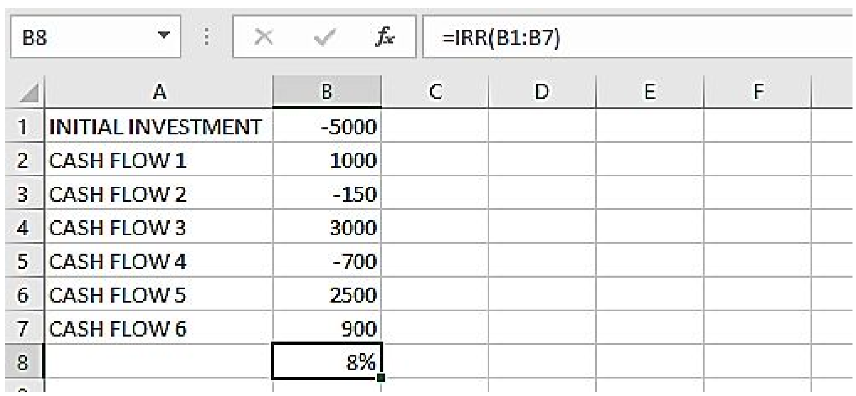
Now, put in this formula =IRR(B1:B7). Press **Enter**.



FREQUENCY | =IRR(B1:B7

	A	B	C	D	E
1	INITIAL INVESTMENT	-5000			
2	CASH FLOW 1	1000			
3	CASH FLOW 2	-150			
4	CASH FLOW 3	3000			
5	CASH FLOW 4	-700			
6	CASH FLOW 5	2500			
7	CASH FLOW 6	900			
8		=IRR(B1:B7			
9		IRR(**values**, [guess])			

Here is your result.



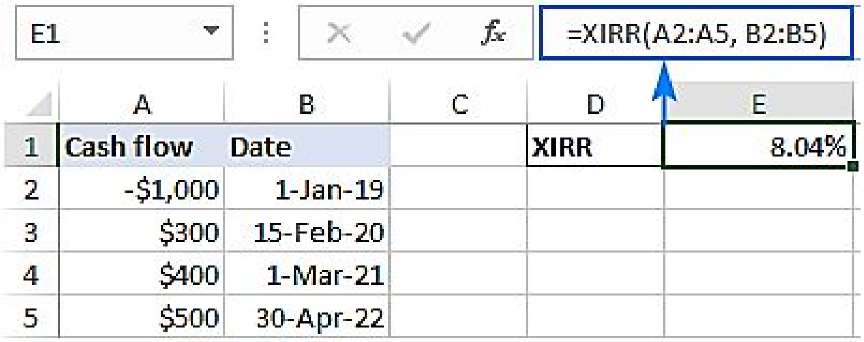
B8 | =IRR(B1:B7)

	A	B	C	D	E	F
1	INITIAL INVESTMENT	-5000				
2	CASH FLOW 1	1000				
3	CASH FLOW 2	-150				
4	CASH FLOW 3	3000				
5	CASH FLOW 4	-700				
6	CASH FLOW 5	2500				
7	CASH FLOW 6	900				
8		8%				

Calculating non-periodic future cash flows

This is done with the XIRR function. The syntax for this formula is XIRR (values, dates, [guess]). Values here mean the range of cells or arrays that represent a series of income and expenditures. Dates mean the dates for the cash flows. It can be in any order. The date of the first investment has to come first. Guess means the expected IRR is given as a percentage or a decimal.

For example;



E1 | =XIRR(A2:A5, B2:B5)

	A	B	C	D	E
1	Cash flow	Date		XIRR	8.04%
2	-$1,000	1-Jan-19			
3	$300	15-Feb-20			
4	$400	1-Mar-21			
5	$500	30-Apr-22			

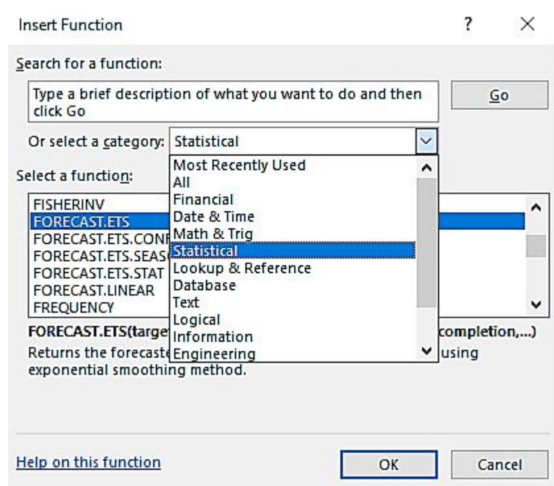
Things to note down when using these functions

- The Excel formula XIRR is used to calculate the internal rate of return for cash flows with mismatched scheduling. The IRR function may be used to model periodic cash flows with unpredictable payment dates.
- At most 1 good (income) and 1 bad (extrovert expenditure) value must be present in the range of outcomes.
- The initial value must be expressed by a negative integer if it is an expenditure (initial investment). The original investment is not amortized; future payments are rolled back to the first cash flow date and marked down on a 365-day basis.
- The proportional component of a date that reflects time is deleted, and all dates are shortened to integers.
- The dates should be correct. Dates are input as hyperlinks to cells with dates or as the output of formulae like the DATE function. Issues may arise if dates are entered in text format.
- Also when computing monthly or weekly cash flows, XIRR in Excel always produces an annualized IRR.

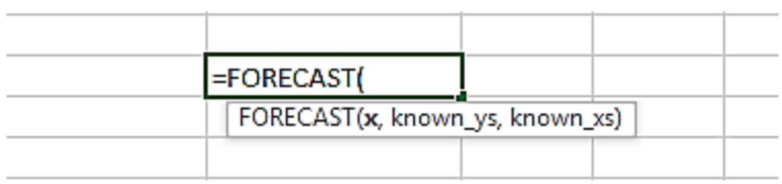
Performing financial forecasting.

The forecast function is the most basic forecasting function you can have. It forecasts the chosen repetition series, but we should first get all of the other known sequences and known outcomes. To anticipate the upcoming demand, the forecast function just employs the Moving Average Forecast technique. If we don't know X, we've input the number manually, starting with 1 for the initial value and working our way up.

Now, on the formula tab, pick Insert. On the dialog box, click the down arrow and choose Statistical. Pick Forecast function.

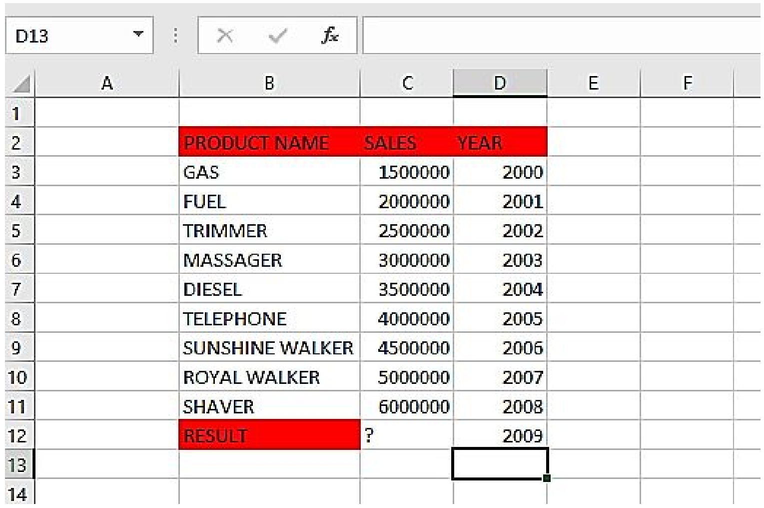


The formula for this is

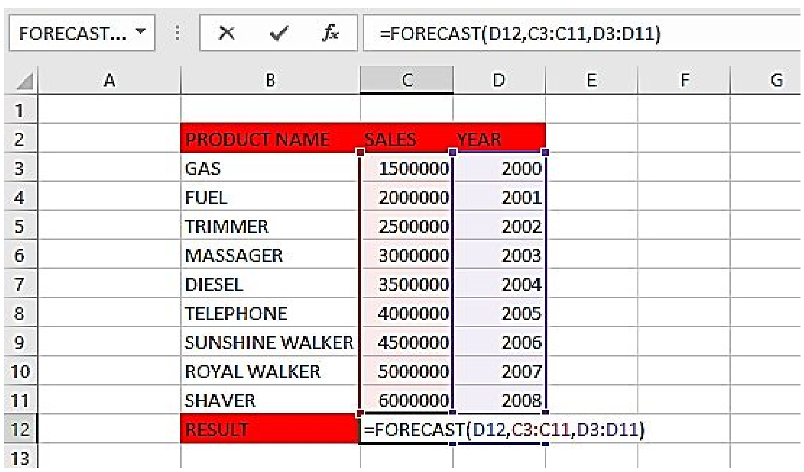


Example;

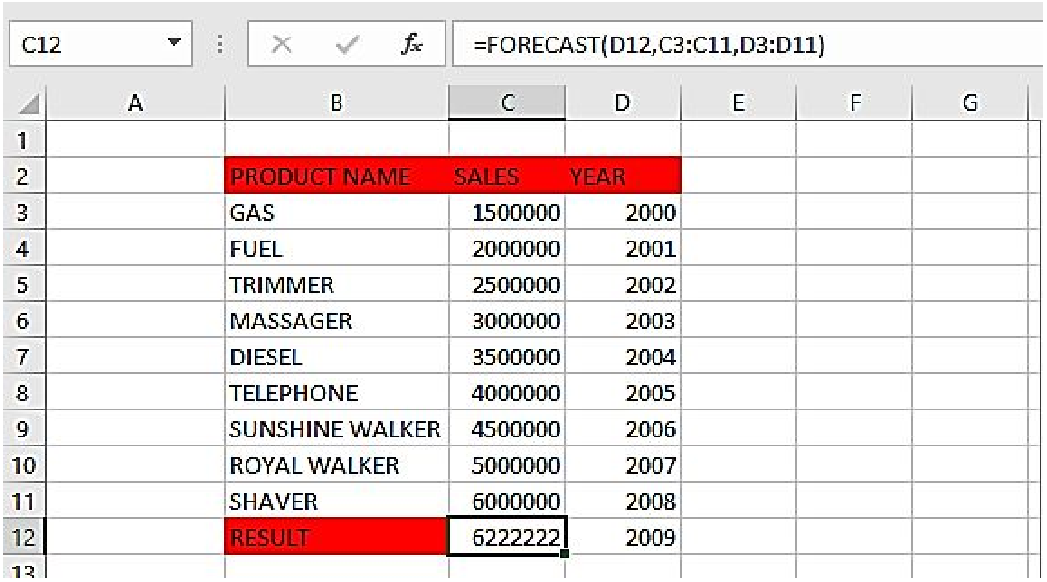
Here, this function will help us predict next month's sales data. Let’s say a company has monthly sales data. Then, the board wants to figure out the sales forecasting so that they can have an idea of their future month sales. In my table below, we are to predict that of 2009.



On the empty cell, type in the FORECAST function. **=FORECAST(D12,C3:C11,D3:D11)**.



Press **ENTER**.



C12 =FORECAST(D12,C3:C11,D3:D11)

	A	B	C	D	E	F	G
1							
2		PRODUCT NAME	SALES	YEAR			
3		GAS	1500000	2000			
4		FUEL	2000000	2001			
5		TRIMMER	2500000	2002			
6		MASSAGER	3000000	2003			
7		DIESEL	3500000	2004			
8		TELEPHONE	4000000	2005			
9		SUNSHINE WALKER	4500000	2006			
10		ROYAL WALKER	5000000	2007			
11		SHAVER	6000000	2008			
12		RESULT	6222222	2009			
13							

You can modify your work by adding a graph to it.

CHAPTER EIGHT

USING FORMULAS FOR STATISTICAL ANALYSIS

Working with weighted averages

The weighted average is calculated with the SUMPRODUCT and SUM functions in the numerator and the denominator, respectively. The weighted average is a method for calculating the averages of numerical values with varying weights.

The relevance (or importance) of each value in the set of data varies depending on the weights used. You will multiply the values with the weights to get the weighted average. The sum of the weights is then divided by the product sum

For instance, in company Z, each employee is rated on two variables: "quality" and "quantity" of projects completed (on a level often). The former is given an 80 percent weighting, while the latter is given a 20 percent weighting.

Only two workers are being considered for clarity's sake (A and B). The employee with a better-weighted average will get a raise.

"Quality" ratings are in cells A2 and B2, while "quantity" ratings are in cells A3 and B3. Ignore the following items' double quotation marks.

For instance, in Column A, cell A1 consists of Employee A, Cell A2 consists of 8, and cell A3 consists of 5. In Column B, cell B1 consists of Employee B, cell B2 consists of 6, and cell B3 consists of 9. In Column C, cell C1 consists of Weights, cell C2 consists of 80%, cell C3 consists of 20%.

This formula; **“=SUMPRODUCT(A2:A3,C2:C3)/SUM(C2:C3)”** will display 7.4. this is the weighted average of employee A. When you use this formula, **“=SUMPRODUCT(B2:B3, C2:C3)/SUM(C2:C3)”** it will display 6.6 which is Employee B.

The weighted average of A is bigger than that of B and that will make Employee A be promoted. If it was done by the normal average, employee B will get promoted.

The weights allocated to the individual variables may not always add up to 100% when computing the weighted average. Furthermore, as matched to values with lower weights, some with higher weights have a bigger influence on the weighted average.

The weighted average is used to get a result that represents the relative significance of each data item. The basic average allocates equal value to all of the data sets. As a result, the weighted average provides more accurate results and a clearer picture of the database than the standard average.

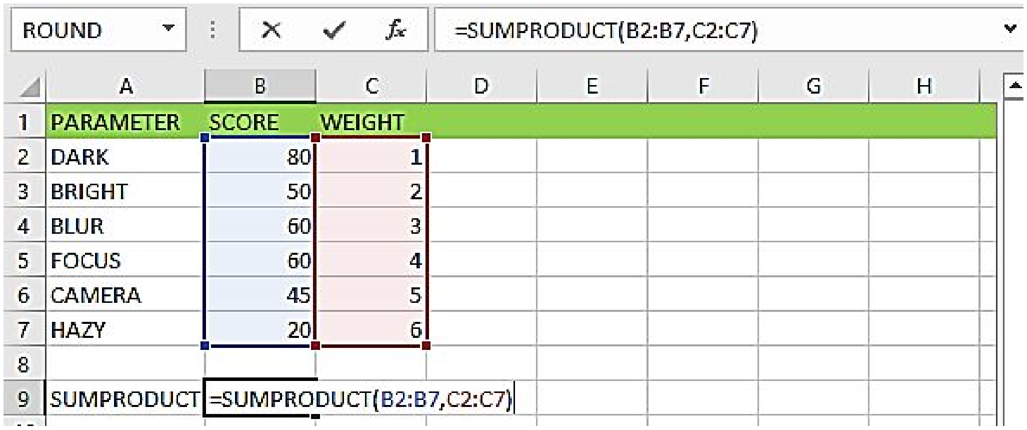
Procedures in carrying out weighted average.

There are some procedures you are to follow when carrying this out. First, you need to make a table. In a column, it should consist of numeric values and in another column, adjacent to the first column, should be the corresponding weight.

C11

	A	B	C	D	E	F	G	H
1	PARAMETER	SCORE	WEIGHT					
2	DARK	80	1					
3	BRIGHT	50	2					
4	BLUR	60	3					

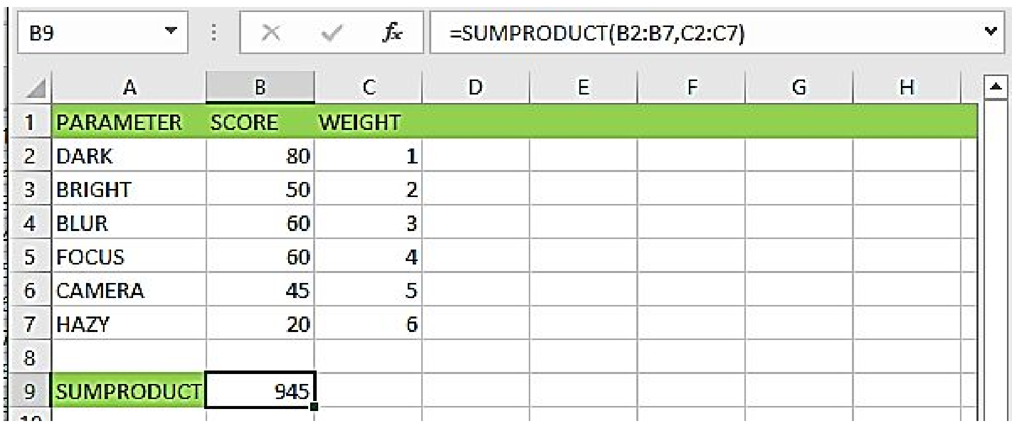
Then, in an empty cell, put in the SUMPRODUCT function. This function is to multiply the numeric values with the weight. It will also sum up the resulting products.



ROUND | =SUMPRODUCT(B2:B7,C2:C7)

	A	B	C	D	E	F	G	H
1	PARAMETER	SCORE	WEIGHT					
2	DARK	80	1					
3	BRIGHT	50	2					
4	BLUR	60	3					
5	FOCUS	60	4					
6	CAMERA	45	5					
7	HAZY	20	6					
8								
9	SUMPRODUCT	=SUMPRODUCT(B2:B7,C2:C7)						

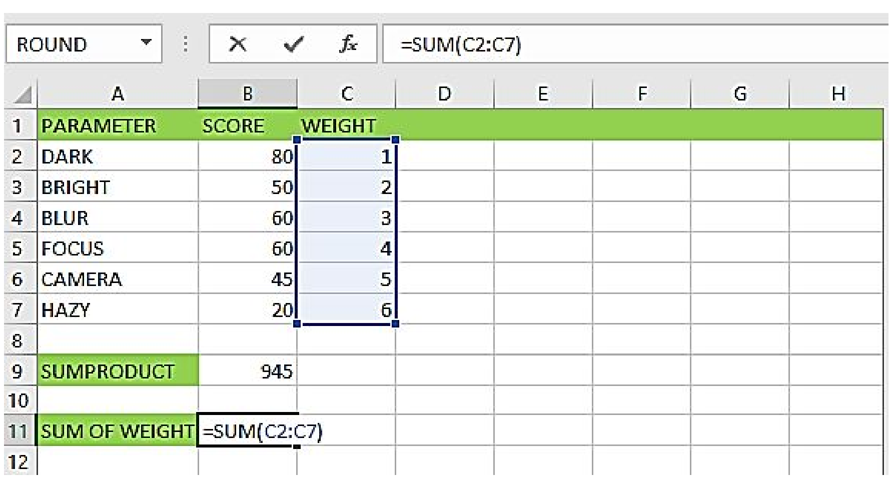
Hit Enter.



B9 | =SUMPRODUCT(B2:B7,C2:C7)

	A	B	C	D	E	F	G	H
1	PARAMETER	SCORE	WEIGHT					
2	DARK	80	1					
3	BRIGHT	50	2					
4	BLUR	60	3					
5	FOCUS	60	4					
6	CAMERA	45	5					
7	HAZY	20	6					
8								
9	SUMPRODUCT	945						

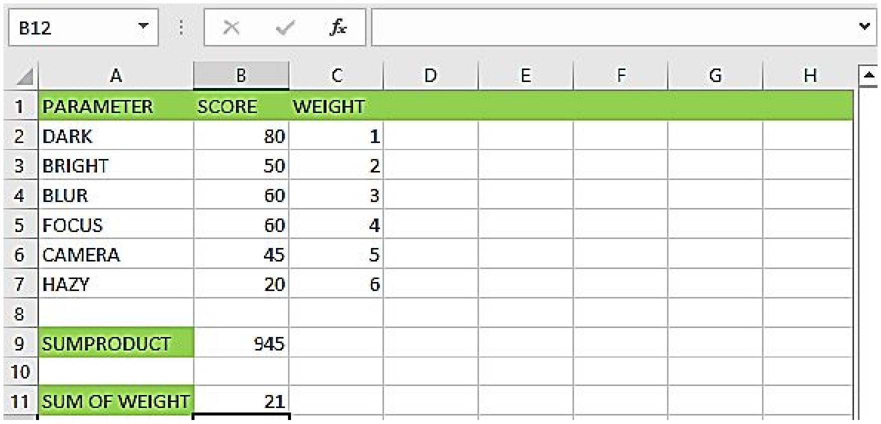
Now, put in the SUM function. This function will add the weights values of all the numeric numbers.



ROUND | =SUM(C2:C7)

	A	B	C	D	E	F	G	H
1	PARAMETER	SCORE	WEIGHT					
2	DARK	80	1					
3	BRIGHT	50	2					
4	BLUR	60	3					
5	FOCUS	60	4					
6	CAMERA	45	5					
7	HAZY	20	6					
8								
9	SUMPRODUCT	945						
10								
11	SUM OF WEIGHT	=SUM(C2:C7)						
12								

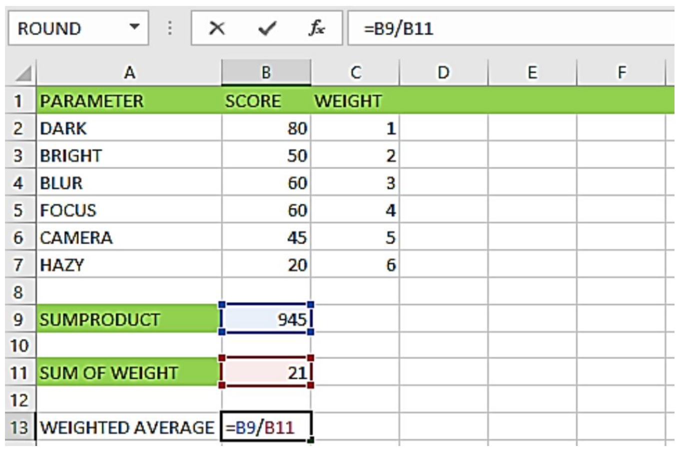
Press Enter.



B12

	A	B	C	D	E	F	G	H
1	PARAMETER	SCORE	WEIGHT					
2	DARK	80	1					
3	BRIGHT	50	2					
4	BLUR	60	3					
5	FOCUS	60	4					
6	CAMERA	45	5					
7	HAZY	20	6					
8								
9	SUMPRODUCT	945						
10								
11	SUM OF WEIGHT	21						

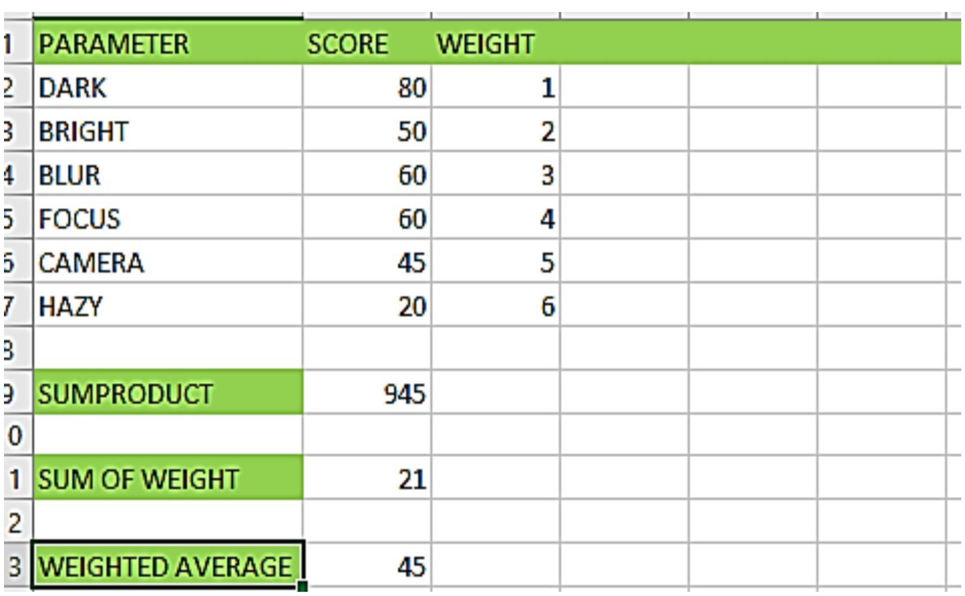
Now, we will divide the result of the SUMPRODUCT function with the result of the SUM function to get the weighted average.



ROUND =B9/B11

	A	B	C	D	E	F
1	PARAMETER	SCORE	WEIGHT			
2	DARK	80	1			
3	BRIGHT	50	2			
4	BLUR	60	3			
5	FOCUS	60	4			
6	CAMERA	45	5			
7	HAZY	20	6			
8						
9	SUMPRODUCT	945				
10						
11	SUM OF WEIGHT	21				
12						
13	WEIGHTED AVERAGE	=B9/B11				

Press Enter.



1	PARAMETER	SCORE	WEIGHT
2	DARK	80	1
3	BRIGHT	50	2
4	BLUR	60	3
5	FOCUS	60	4
6	CAMERA	45	5
7	HAZY	20	6
8			
9	SUMPRODUCT	945	
10			
11	SUM OF WEIGHT	21	
12			
13	WEIGHTED AVERAGE	45	

That’s how you carry out the weighted average.

Smoothing Data with moving averages

By using the AVERAGE function in several iterations, the Moving Average function in Excel is used to provide the average of moving iteration data. The dataset, which may include several ebbs and flows, is smoothed out using a moving average.

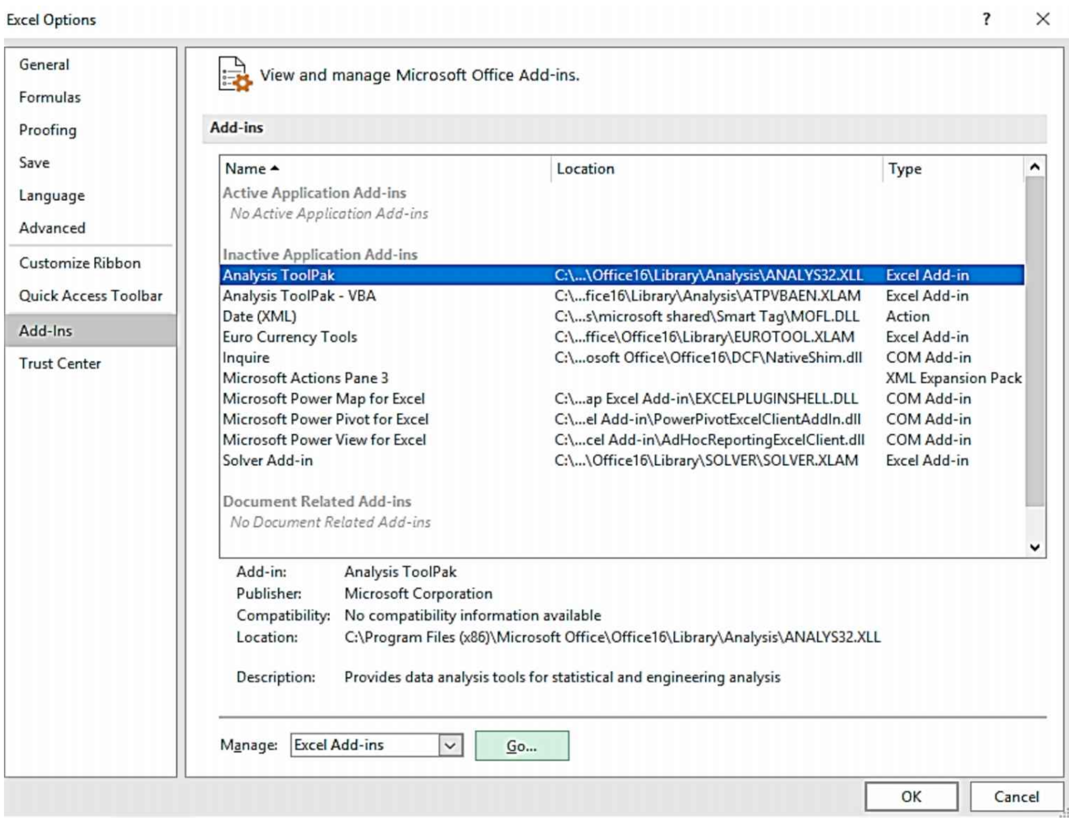
We may utilize an integrated program for Moving Average, which can be found under the Data menu ribbon's Data Analysis option. Pick the input range and output cell for this, and the smoothed moving average data will be returned instantly.

Pick at most the latest three iteration data if we wish to utilize the AVERAGE function. In several disciplines, the moving average approach is commonly utilized in Sales Forecasts and Estimation of the Next Quantity.

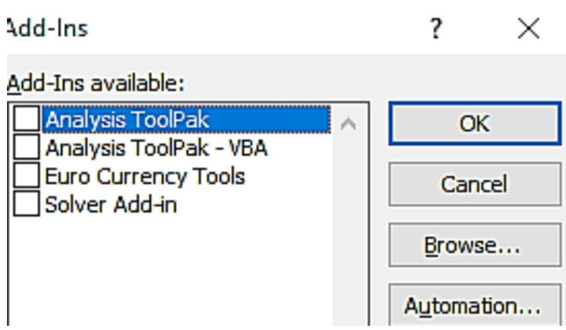
Where to find this tool:

The tool is in-built, yes, but you have to unleash it from where it is. You can find it under the ANALYSIS TOOLPAK option in Excel. Follow the steps below to unleash it.

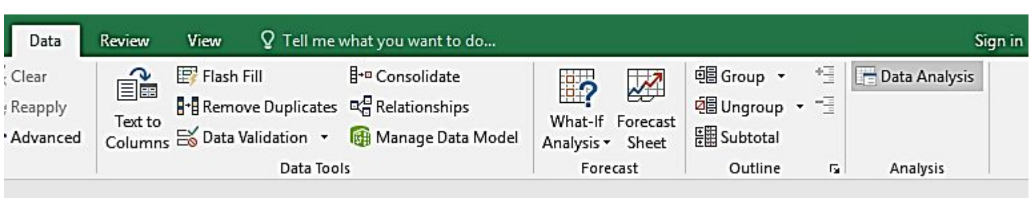
Click on File and select Options. In the dialog box that displays, click Add-Ins, choose Excel Add-Ins, and click GO.



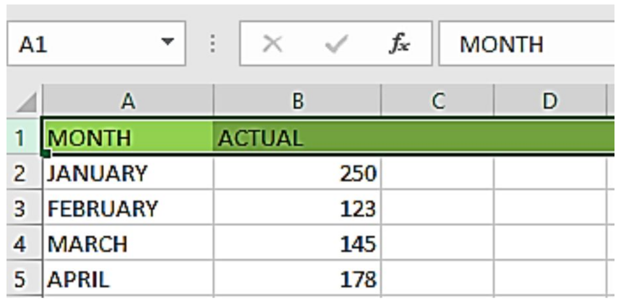
The Add-Ins dialog box will open. Click on Analysis ToolPak. Click Ok.



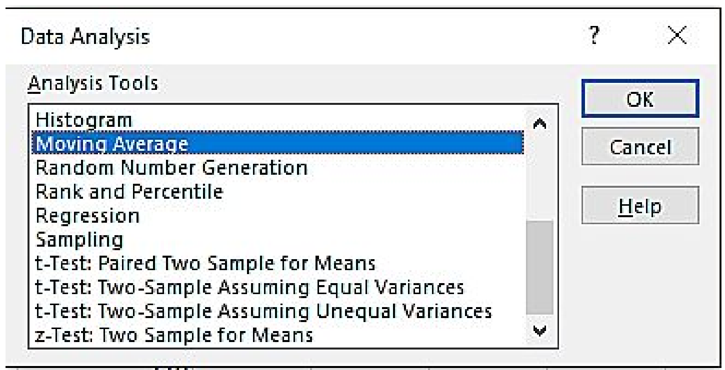
The tool will be added to the Data Analysis group under the Data Tab.



When you click on it, you will find the Moving Average option. Now, let's have an example. We will do this with the help of the average formula. So, below I have some data on my worksheet.

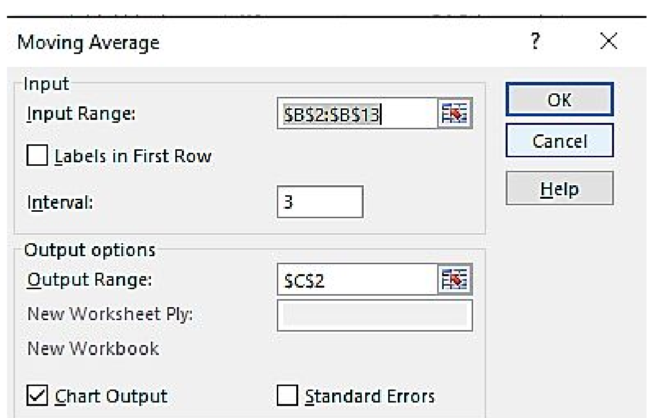


So, I click on the Data Tab and pick Data Analysis. The Data Analysis box will display. Search for Moving Average and choose it. select Ok.



In the next box that displays, choose the sales data from B2 to B13 for the Input Range option. On the interval option, you are to put in how many months that is needed to be removed by the average.

Here, I used 3. Then, choose the output range. I chose cell C2. Choose the Chart Output. This is optional. If you want to show a chart, then pick it. choose Ok when you are done.

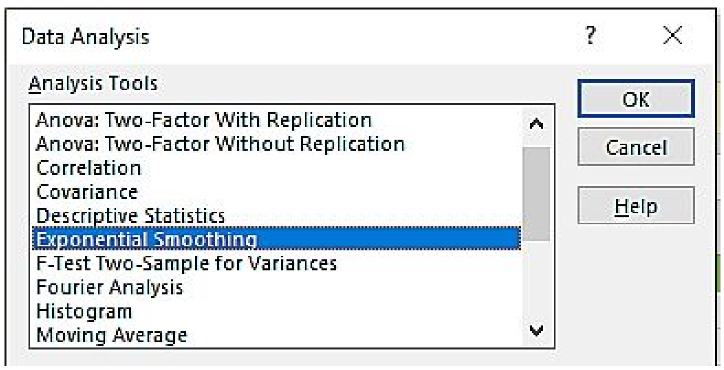


You will find the Moving Average chart and the output in your worksheet.

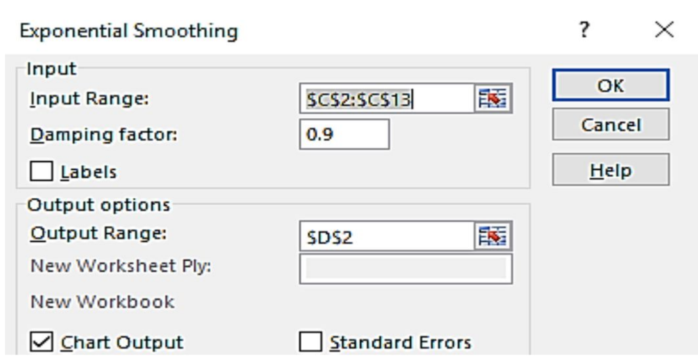
	A	B	C
1	MONTH	ACTUAL	
2	JANUARY	250	#N/A
3	FEBRUARY	123	#N/A
4	MARCH	145	173
5	APRIL	178	149
6	MAY	256	193
7	JUNE	142	192
8	JULY	112	170
9	AUGUST	110	121
10	SEPTEMBER	115	112
11	OCTOBER	130	118
12	NOVEMBER	144	130
13	DECEMBER	230	168

Applying exponential smoothing to volatile data

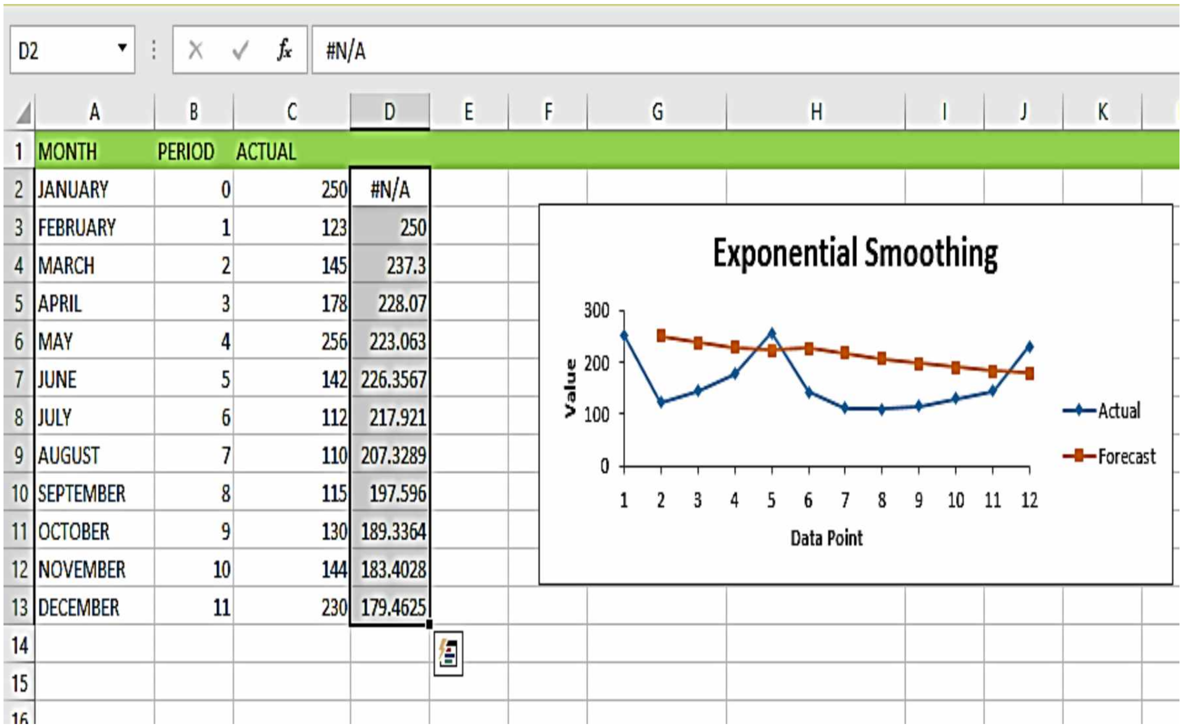
This is just like the moving average. Once you have your data ready, click on the Data Tab and select Data Analysis. Search for Exponential Smoothing and select it. Click Ok.



The Exponential smoothing box will display. On the Input Range, choose the range. Here I choose C2:C13. For the Damping Factor box, put in the value 0.9. This is the damping factor. It is equal to the 1- α which is the smoothing factor. On the Output range, choose the cell where you want the output. If you need a chart, tick the chart output box. Select OK.



You will find the exponential smoothing figures and the chart on your worksheet.



MONTH	PERIOD	ACTUAL	
JANUARY	0	250	#N/A
FEBRUARY	1	123	250
MARCH	2	145	237.3
APRIL	3	178	228.07
MAY	4	256	223.063
JUNE	5	142	226.3567
JULY	6	112	217.921
AUGUST	7	110	207.3289
SEPTEMBER	8	115	197.596
OCTOBER	9	130	189.3364
NOVEMBER	10	144	183.4028
DECEMBER	11	230	179.4625

Explanation: When α=0.1 is used, the prior data value is given a low weight, while the prior smoothed value is given a high weight (0.9). The data points in the graph here are rising in number. Since there is no data point before it, the graph does not compute the smoothed value for the initial data point.

Using functions to create descriptive statistics

With every piece of data, descriptive statistics are among the core "should learn" concepts. It offers us an overall picture of data patterns, such as learning about the range, the mean, mode, and median, as well as the variance and standard deviation, , Count, maximum, and minimum are all used.

Descriptive statistics are helpful because they enable you to describe a vast quantity of data. Let's imagine you have information on one thousand people's earnings. Nobody wants to read a thousand bits of data, and even if they did, they will not be capable of extracting any relevant information. When you condense it, though, it does become useful: an average pays or median income is a lot simpler to comprehend than lots of data. Below is an image of its features;

Statistic	Description
Mean	Shows the arithmetic mean of the sample data.
Standard Error	Shows the standard error of the data set
Median	Shows the middle value in the data set
Mode	Shows the most common value in the data set.
Standard Deviation	Shows the sample standard deviation measure for the dataset
Sample Variance	Shows the sample variance for the data set
Kurtosis	Shows the kurtosis of the distribution.
Skewness	Shows the skewness of the data set's distribution.
Range	Shows the difference between the largest and smallest values in the data set.
Minimum	Shows the smallest value in the data set.
Maximum	Shows the largest value in the data set.
Sum	Adds all the values in the data set together to calculate the sum
Count	Counts the number of values in a data set.
Largest(X)	Shows the largest X value in the data set.
Smallest(X)	Shows the smallest X value in the data set.

How do you calculate this?

First: enter your information into Excel in a single column. For instance, if your data collection has ten items, enter them into fields A1 through A10.

Second: go to the "Data" tab, then to the "Analysis" group, and finally to "Data Analysis."

Third: on the pop-up Data Analysis box, choose "Descriptive Statistics."

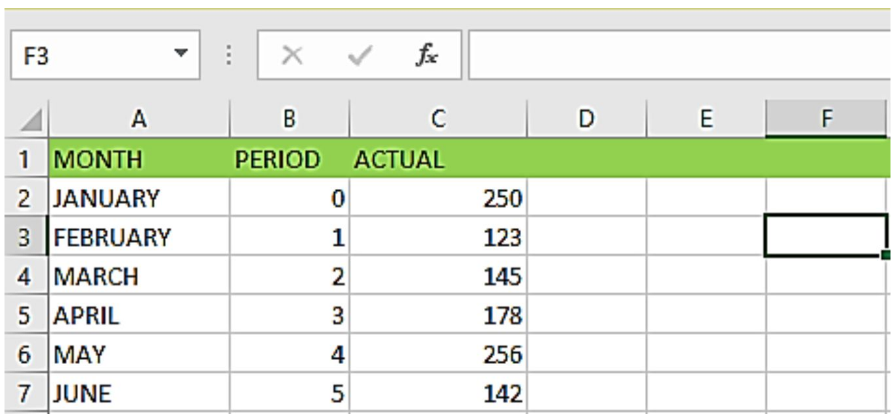
Fourth: In the "Input Range" text box, enter an input range. In the box, enter "A1:A10" for example.

Fifth: Once you have named the column in row 1, click the "Labels in the first row" check box; otherwise, leave it unmarked.

Sixth: In the "Output Range" box, enter a cell location. Type "C1" as an example. Make sure there is no data in two neighboring columns.

Seventh: To show Excel descriptive statistics, tick the "Summary Statistics" option and then click "OK." In the column you chose as the Output Range, a set of descriptive statistics will be supplied.

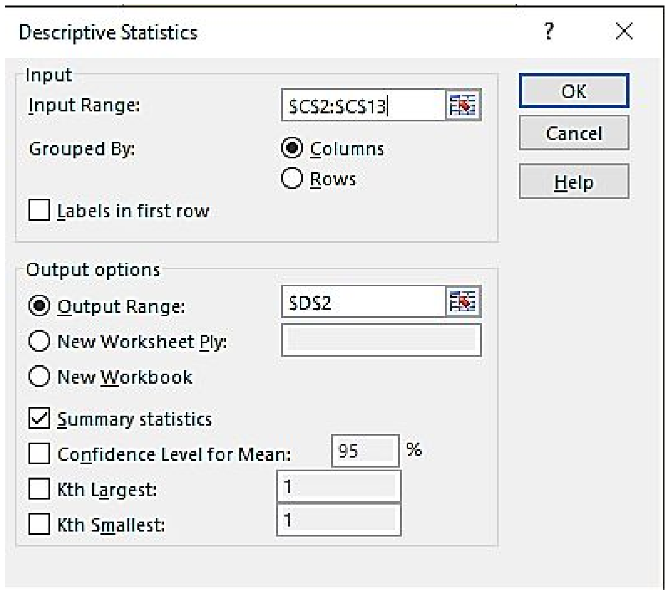
Let's work with an example.



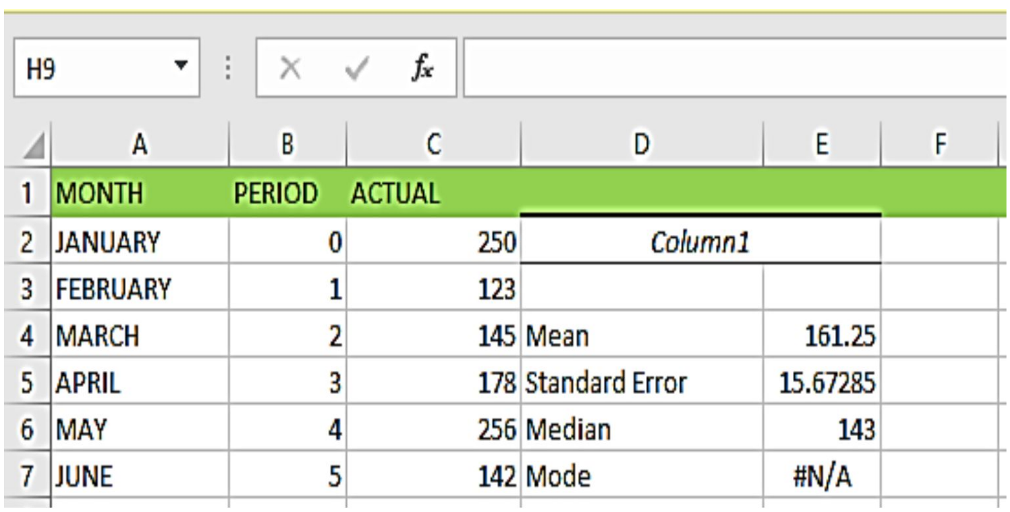
F3

	A	B	C	D	E	F
1	MONTH	PERIOD	ACTUAL			
2	JANUARY	0	250			
3	FEBRUARY	1	123			
4	MARCH	2	145			
5	APRIL	3	178			
6	MAY	4	256			
7	JUNE	5	142			

So, follow the steps above to the third three. With my data above, I will select the input range as $C$2:$C$13. I have named my first row, so I will check the Labels in the First-row box. My output range will be $D$2. Click the box on Summary Statistics. Select OK.

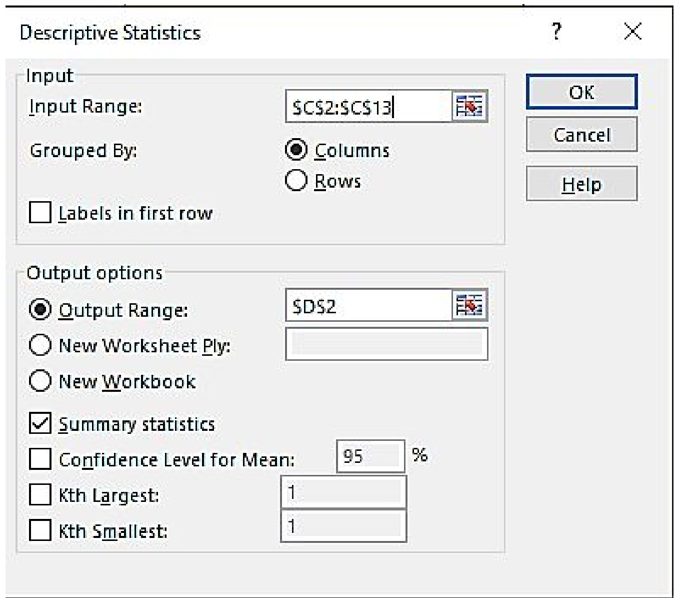


You will see the descriptive statistics on your worksheet. You will see the mean, median, mode, and other useful stats of your data.



Getting the largest or smallest value

With these steps used above, you will find the largest and smallest value within the descriptive statistics column. This time, you will have to tick the box on the Kth Largest and Kth Lowest boxes.



Calculating mean, median, and mode

As I explained in the topic on Descriptive Statistics, you get the mean, median, mode, and other options for your data using that process. It is an easy thing to carry out.

Identifying statistical outliers with an interquartile range

An outlier is a value that deviates abnormally from the rest of the dataset's values. Outliers may be troublesome since they can skew an analysis' findings. The interquartile range is a frequent approach to discovering outliers in a dataset.

The distance between the 25th percentile (Q1) and the 75th percentile (Q3) together in the dataset is known as the interquartile range or IQR. It calculates the dispersion of values in the middle 50%. An event is considered an outlier if its value is 1.5 times more than or less than IQR, according to one prevalent technique.

Follow the steps below to do so:

First, you create your data.

Data
1
3
3
4
8
11

Then, find out the first and third quartile. Here the first is 5 while the third is 20.75.

Data
1
3
3
4
8
11
13
14
15
17
22
24
26

Q1 = 5

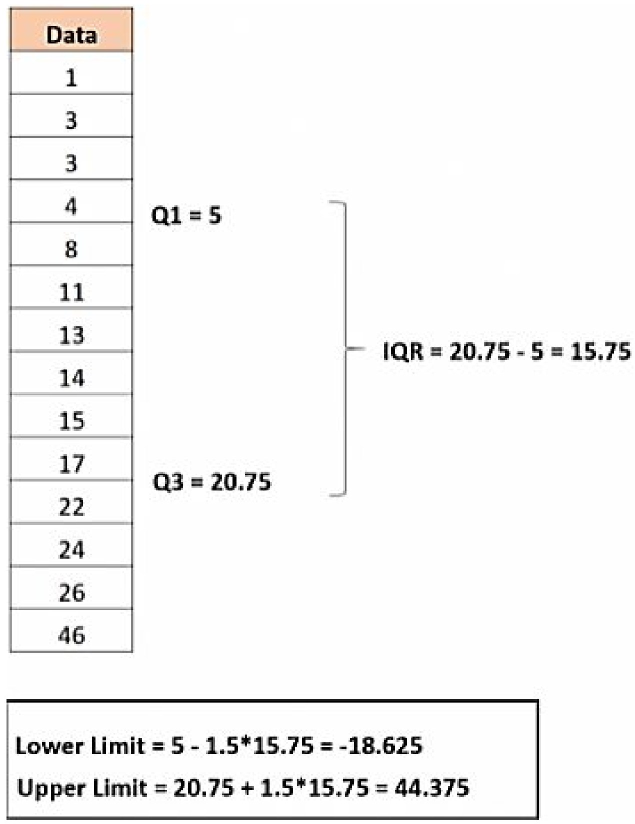
IQR = 20.75 - 5 = 15.75

Q3 = 20.75

The interquartile range will be 20.75 – 5 = 15.75.

The next step is to get the lower and upper limits. To get the lower limits, use this formula; Q1 – 1.5*IQR. Here, it is 5 – 1.5*15.75 = -18.625.

To get the upper limit, use this formula; Q3 + 1.5*IQR. Here, it is 20.75 +1.5 = 44.375.



The final step is to figure out the Outliers. The only thing observed in this dataset that has a value less than the lower limit or bigger than the upper limit is 46. So, 46 is the outlier.

Creating a frequency distribution

We will do this by using the frequency function. The frequency formula is =FREQUENCY (data_array, bins_array).

Data array: The frequencies are counted using a set of array values. The frequency function outputs an array of value 0 if the data array values are zero.

Bins array: A collection of array values that are used to organize the input array's contents. It will yield the array items from the data sequence if the bin array values are zero. you will find this function in the formula tab.

Steps in doing this:

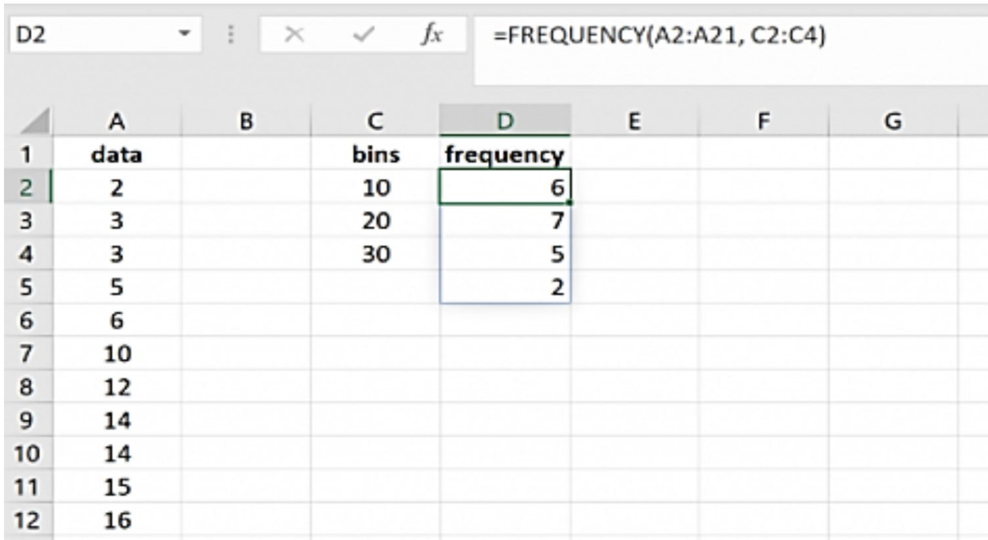
Here is my table here, I have a dataset that consists of twenty values.

	A	B	C	D	E	F
1	data					
2	2					
3	3					
4	3					
5	5					
6	6					
7	10					
8	12					
9	14					
10	14					
11	15					
12	16					
13	17					
14	19					
15	22					
16	23					
17	24					
18	29					
19	30					
20	32					
21	34					

So, the first thing to do is to let Excel know the upper limits for our bins in the frequency distribution. Here, I used 10, 20, and 30 i.e. 0-10, 11-20, 21-30, and 30+.

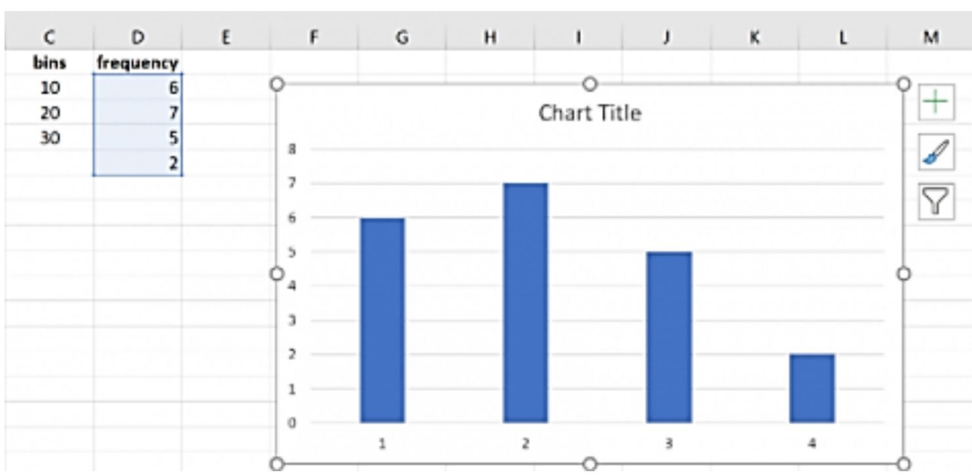
	A	B	C	D	E
1	data		bins		
2	2		10		
3	3		20		
4	3		30		
5	5				
6	6				
7	10				

Now, to calculate the frequency of each bin, I will apply the Function formula. =Frequency (A2:A21,C2:C4).



Only 6 values are in the range of 0-10, only 7 values are in the range of 11-20, only 5 values are in the range of 21-30, and only two values are bigger than 30. Now, with the steps below, we will visualize the distribution.

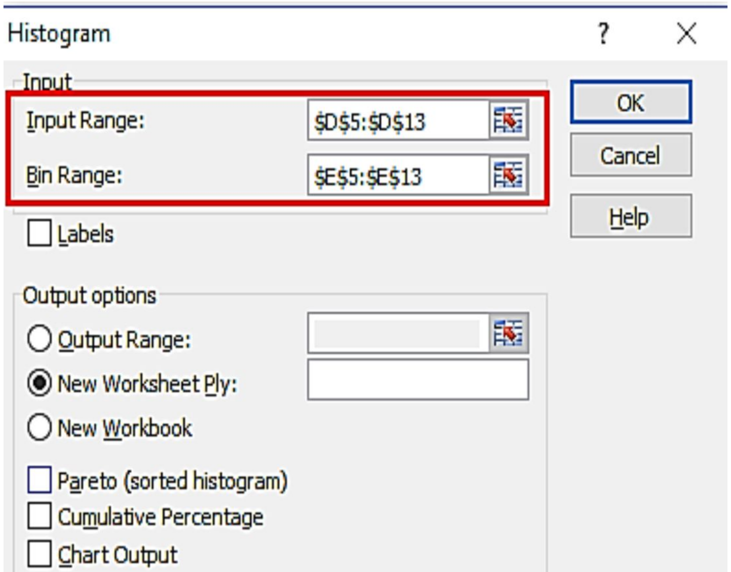
First, highlight D2:D5. Select Insert from the ribbon and click on the 2-D Column. A chart will be displayed on your worksheet which shows the frequencies for each bin.



An alternative to the Frequency function

The Analysis ToolPak serves as an alternative to the frequency function. With it, you can create histograms for your frequency distribution. So with your data and the bin ready, simply click on Data Analysis. Search for Histogram and pick Ok.

In the Histogram box, put in the input range and the Bin range. Click on the box next to the labels, Cumulative Percentage, and Chart Output options.



Click Ok two times.

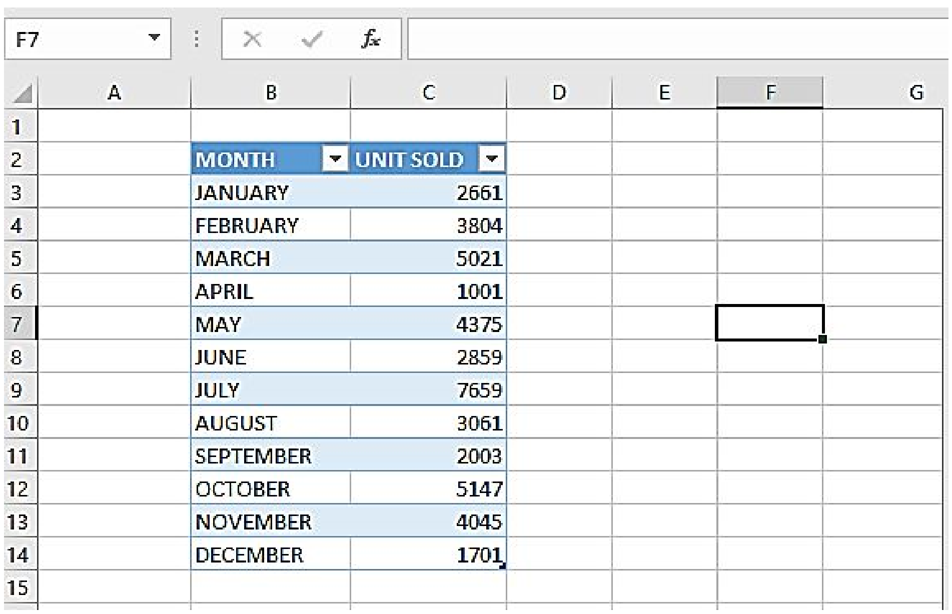
You will get the histogram and the chart on your worksheet.

CHAPTER NINE

USING FORMULAS WITH TABLES AND CONDITIONAL FORMATTING

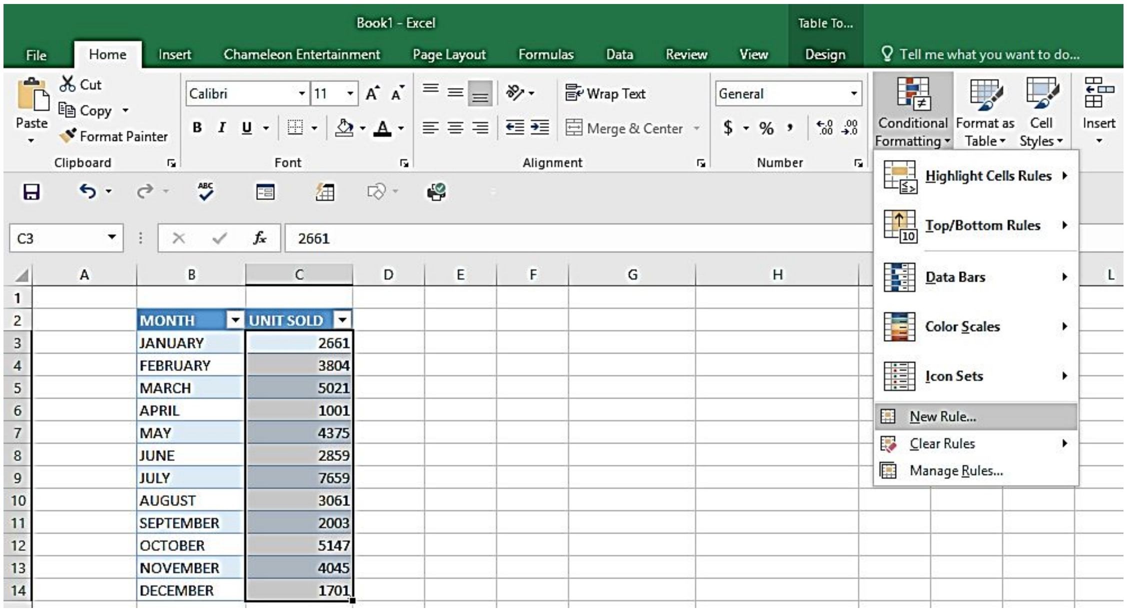
Highlighting cells that meet certain criteria

With Conditional formatting, you can highlight cells that meet up certain conditions in Excel. In my example here, I want to show the formatting of cells that are below the value of 4000.

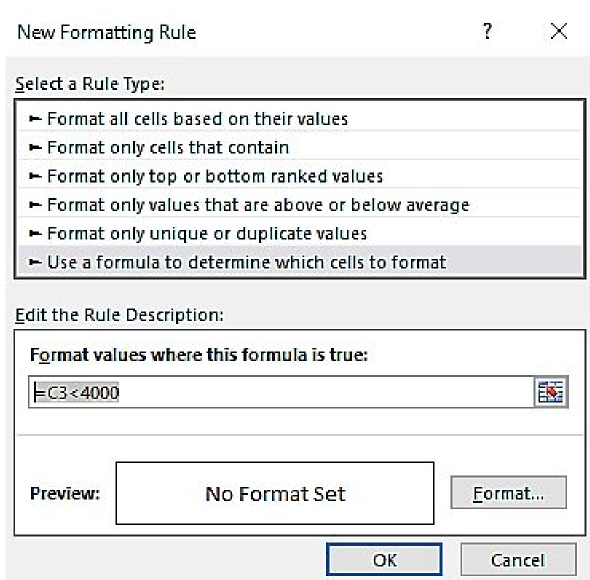


Follow the steps below:

Select the cell range for the formatting. On the Home tab, pick Conditional Formatting. Select New Rule.



The New Formatting Rule window will display. Select “Use a formula to determine which cell to format”. in the Edit the rule description, put in the formula **=C3<4000**. Do not include the dollar sign. Click Format.



The Format cell box will be displayed. On it, you have different formatting options to choose from. Make a choice and select OK. Then, on the New Formatting Rule box, click OK.

C3 *fx* 2661

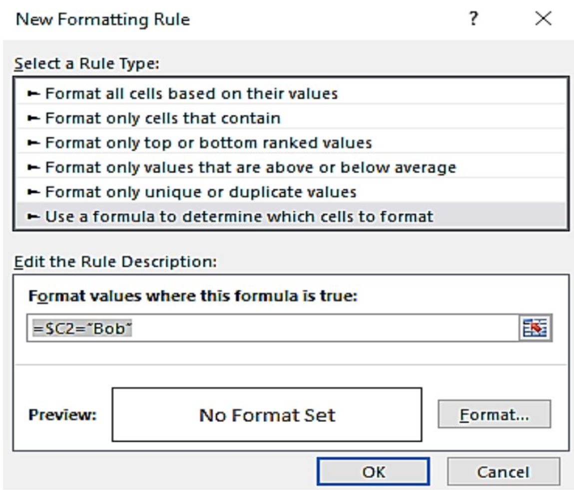
	A	B	C	D	E	F	G
1							
2		MONTH	UNIT SOLD				
3		JANUARY	2661				
4		FEBRUARY	3804				
5		MARCH	5021				
6		APRIL	1001				
7		MAY	4375				
8		JUNE	2859				
9		JULY	7659				
10		AUGUST	3061				
11		SEPTEMBER	2003				
12		OCTOBER	5147				
13		NOVEMBER	4045				
14		DECEMBER	1701				
15							

Highlighting cells based on the value of another cell

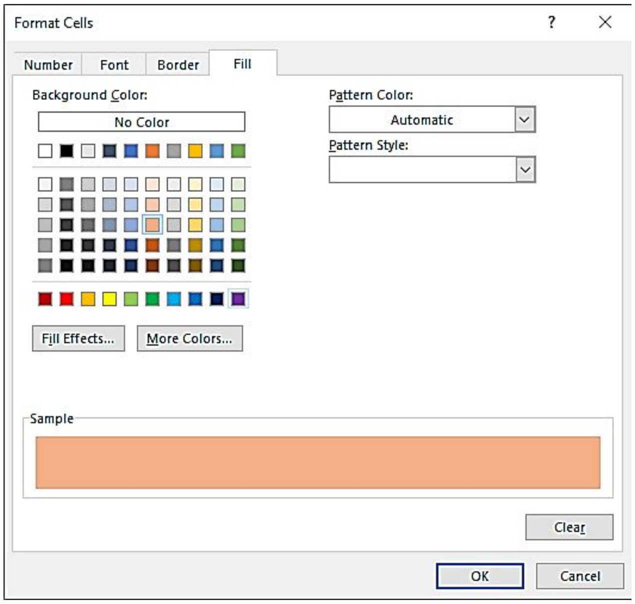
In my example below, I want to highlight the records that contain everything about Bob.

	A	B	C	D	E	F
1	Date	Item	Sales Rep	Quantity	Price	Commission
2	7/1/2019	Projector	Bob	13	150	11%
3	7/1/2019	White Board	Mark	8	40	9%
4	7/2/2019	White Board	Stacey	7	40	7%
5	7/3/2019	White Board	Mark	18	40	8%
6	7/5/2019	Office Chair	Stacey	19	230	6%

So, I highlight the entire worksheet, select Conditional Formatting (Home tab) and select New rules. Choose the **“Use a formula to determine which cells to format”** option. On the box, below it, type in this formula **=$C2=” Bob”**



Then, click on the Format option. Click on the Fill tab and choose a color that you want it to be highlighted with. Then, click Ok.



This will be the result.

Date	Item	Sales Rep	Quantity	Price	Commission
7/1/2018	Projector	Bob	13	150	11%
7/1/2018	White Board	Mark	8	40	9%
7/2/2018	White Board	Stacey	7	40	7%
7/3/2018	White Board	Mark	18	40	8%
7/5/2018	Office Chair	Stacey	19	230	6%
7/5/2018	Projector	John	4	150	10%
7/8/2018	Printer	Bob	9	80	6%
7/10/2018	Printer	Laura	16	80	2%
7/10/2018	Office Chair	Mark	15	230	9%
7/10/2018	Diary	Bob	15	16	1%
7/10/2018	Office Chair	John	7	230	2%
7/13/2018	Diary	Laura	23	16	11%
7/17/2018	White Board	Bob	20	40	5%
7/17/2018	Office Chair	Mark	9	230	3%
7/20/2018	White Board	Stacey	23	40	6%
7/20/2018	White Board	Stacey	4	40	5%

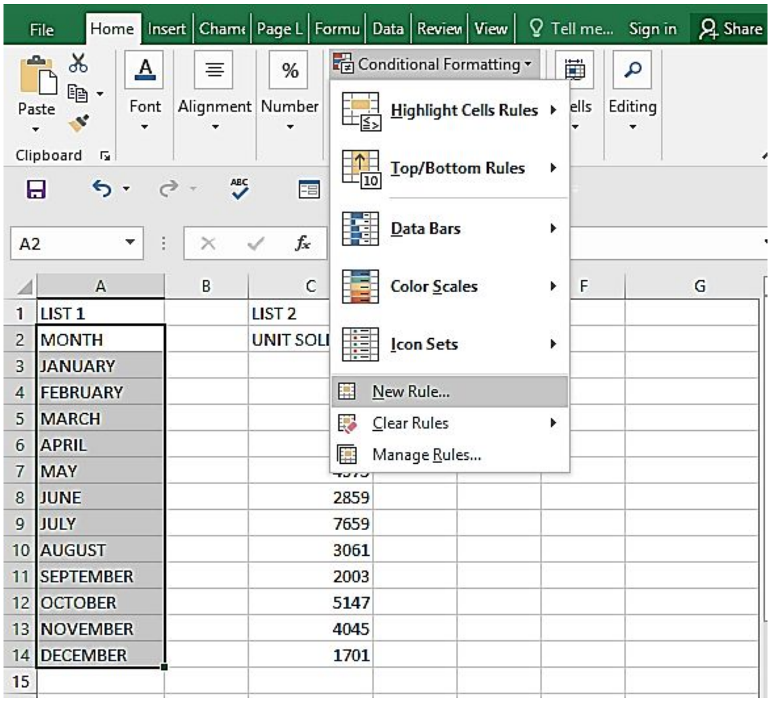
Explanation

Conditional Formatting examines each cell for the condition we've set, which is =$C2=" Bob" in this case. As a result, it will check whether cell C2 contains the name Bob or not while inspecting each cell in row A2. If it does, that cell is highlighted; if it does not, it is not.

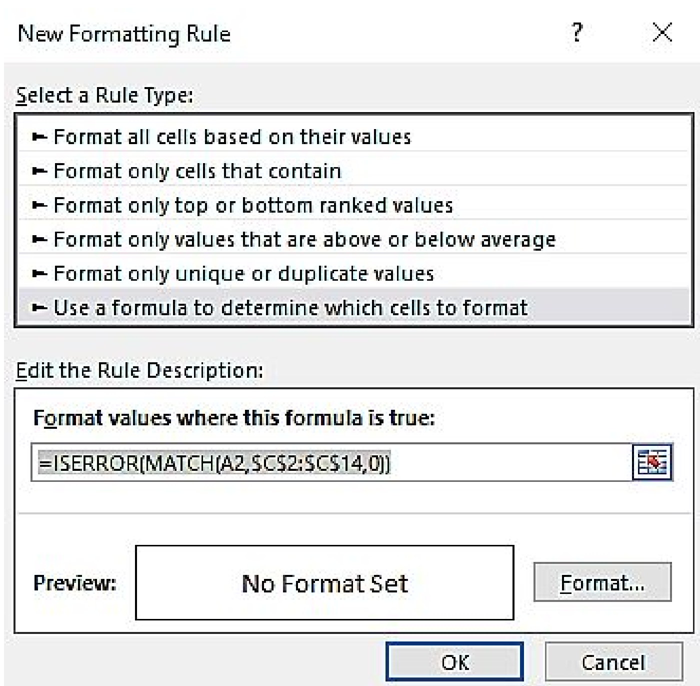
It's important to note that the dollar symbol ($) comes before the column alphabet ($C1). By doing so, we've ensured that the column will always be C. When cell A2 is tested for the formula, it will also check cell C2, and when cell A3 is examined for the condition, it will also check cell C3. By using conditional formatting, we can highlight the whole row.

Highlighting values that exist in List1 but not List2

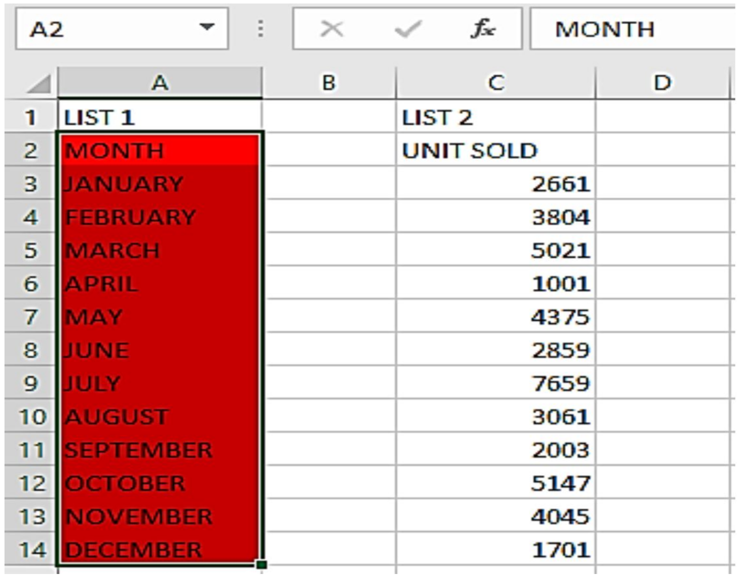
First, choose the cells in List 1 whose values are for highlighting. Click on Conditional Formatting. Pick New Rule.



Pick **"Use a formula to determine which cells to format"**. In the formula box, type in this formula; ***=ISERROR(MATCH(A2,$C$2:$C$14,0)).***



Click Format and choose a color from the Fill Tab. Click OK. Select OK again. You will find out that values that exist in List 1 but not in List 2 are highlighted.



A2 | MONTH

	A	B	C	D
1	LIST 1		LIST 2	
2	MONTH		UNIT SOLD	
3	JANUARY		2661	
4	FEBRUARY		3804	
5	MARCH		5021	
6	APRIL		1001	
7	MAY		4375	
8	JUNE		2859	
9	JULY		7659	
10	AUGUST		3061	
11	SEPTEMBER		2003	
12	OCTOBER		5147	
13	NOVEMBER		4045	
14	DECEMBER		1701	

In the formula I used above, A2 means the first cell in the column for the highlighting. C2C14 is the other column that you are comparing.

Highlighting values that exist in List1 and List2

Select the column of the range for highlighting. Choose Conditional Formatting and pick New Rule. Pick “Use a formula to determine which cells to format”.

Put in this formula =NOT(ISNA(VLOOKUP(A2,$B:$B,1,FALSE))). A2 here stands for the first cell of the column for highlighting. B: B stands for the column for comparison. You can modify them whenever you want to.

Click on the Format button. Make some formatting for the highlighting. Choose a color, font, and so on. Click OK. You will see that they have highlighted the values that exist in List1 and List2.

Highlighting based on Dates

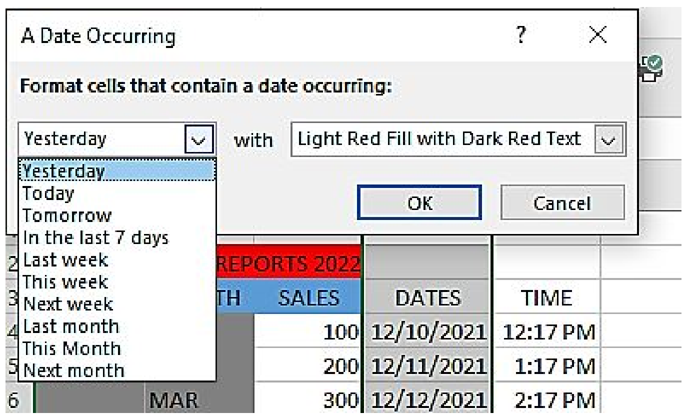
Conditional formatting could be used to highlight cells that include dates before today or throughout a date range before the present date. Conditional formatting allows you to highlight certain cells in a worksheet by coloring them depending on rules or criteria.

If you wish to emphasize past due dates, such as bills that are 30, 60, or 90 days past due, this formatting is useful. You may apply many rules to a variety of cells by using conditional formatting.

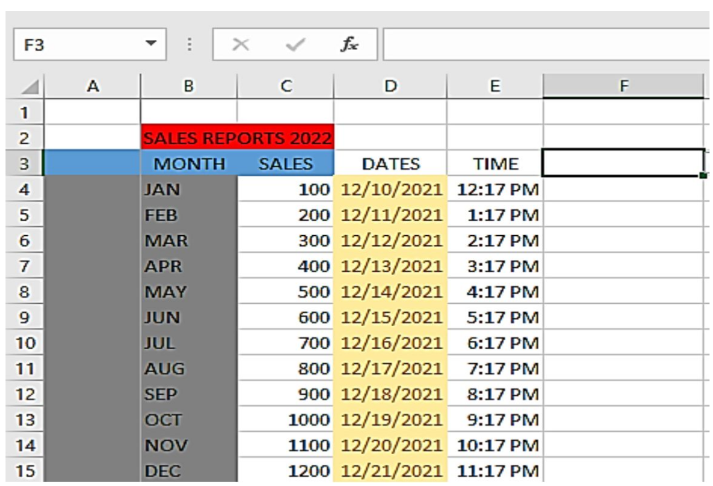
There are different ways you can highlight dates using conditional formatting. Here, I will show you the ways.

The first process is by using built-in conditional formatting

- First, choose the cells for highlighting.
- Select Conditional Formatting and pick Highlight cell rules.
- A list will appear. Pick Dates Occurring. On the dialog box that displays, pick an option from the first drop-down list such as Today, Tomorrow, etc. From the second list, pick a custom format. Then, pick a color you want for the cells.



- Select OK and OK again.



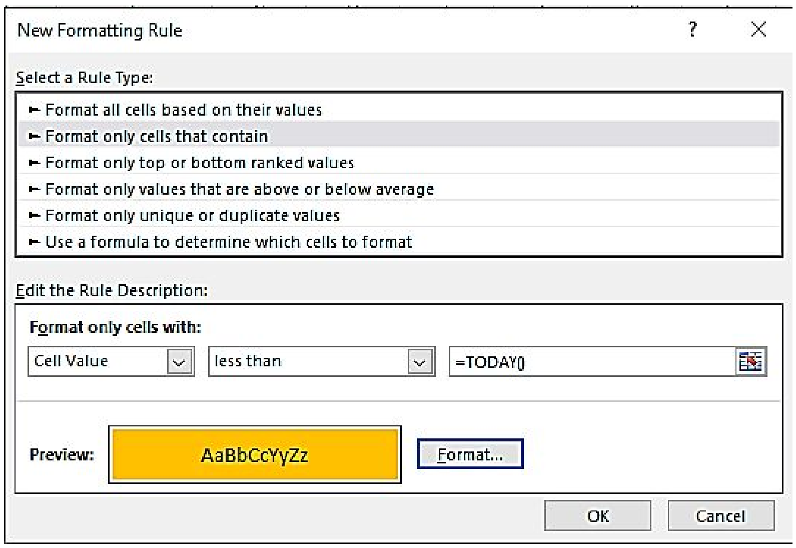
The second process is by creating a conditional formatting rule based on the content of the cells.

This process allows you to choose how you want the cells to be formatted, and you can make some modifications more than the in-built process. So, let’s get started.

First, pick the cells for highlighting and pick Conditional formatting.

Hit New Rule. Choose Format only cells that contain.

On the first down arrow, the option there should be Cell Value. On the second one, pick Less Than or Greater Than as the option. For the Text Box, type in =TODAY().



Click Format and make some modifications. Click Ok two times.

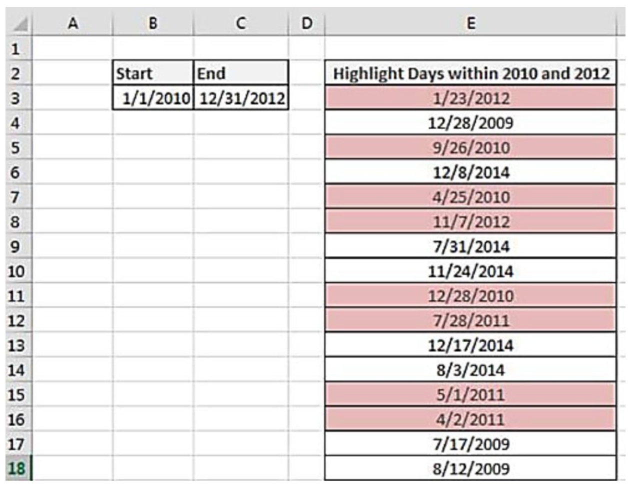
	A	B	C	D	E	F	G
1							
2		SALES REPORTS 2022					
3		MONTH	SALES	DATES	TIME		
4		JAN	100	12/1/2022	12:17 PM		
5		FEB	200	8/1/2022	1:17 PM		
6		MAR	300	4/1/2022	2:17 PM		
7		APR	400	2/1/2022	3:17 PM		
8		MAY	500	2/2/2022	4:17 PM		
9		JUN	600	2/3/2022	5:17 PM		
10		JUL	700	2/4/2022	6:17 PM		
11		AUG	800	2/5/2022	7:17 PM		
12		SEP	900	2/6/2022	8:17 PM		
13		OCT	1000	2/7/2022	9:17 PM		
14		NOV	1100	2/8/2022	10:17 PM		
15		DEC	1200	2/9/2022	11:17 PM		
16		TOTAL	0				

Highlighting days between two dates

First, select the cells. Click Conditional Formatting. Choose New Rule.

Pick Use a formula to determine which cells to Format. in the formula box, enter this formula; =AND(E3>=$B$3, E3<=$C$3). The AND function is used here to compare the date in the cells you have selected. Do not apply the dollar sign for the targeted cell. Here, mine is cell E3. If you click on the cell instead of typing it in, Excel will make it an absolute reference.

Click Format and make some modifications. Click OK two times.

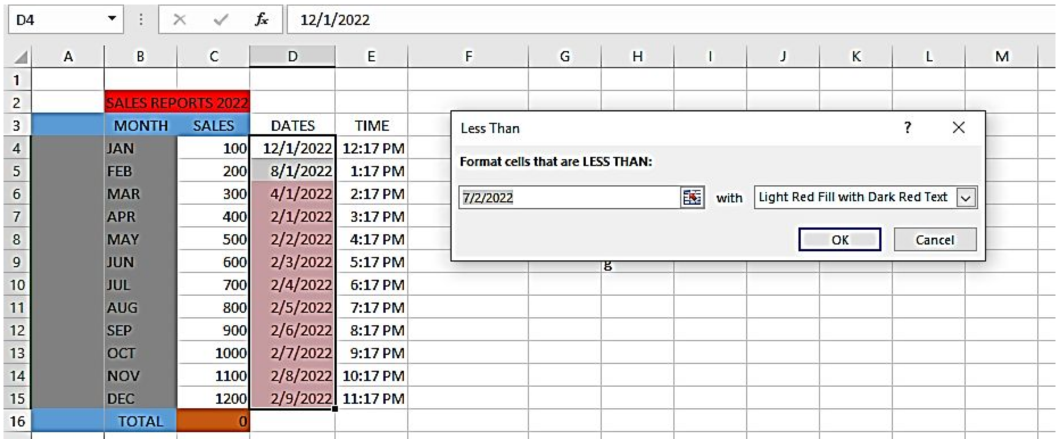


	A	B	C	D	E
1					
2		Start	End		Highlight Days within 2010 and 2012
3		1/1/2010	12/31/2012		1/23/2012
4					12/28/2009
5					9/26/2010
6					12/8/2014
7					4/25/2010
8					11/7/2012
9					7/31/2014
10					11/24/2014
11					12/28/2010
12					7/28/2011
13					12/17/2014
14					8/3/2014
15					5/1/2011
16					4/2/2011
17					7/17/2009
18					8/12/2009

Highlighting days between a due date.

Pick the cells for formatting. Click Conditional Formatting. Pick Highlight Cells Rules.

Hit Less Than. In the dialog box that displays, you will see a date that was entered by Excel automatically as the LESS THAN rule. You will also find out that the cells have been highlighted with a red color which is displayed as the preview for you.



Excel wants to highlight the cells but we want to highlight just the due dates. To do that, we will replace the date with the TODAY function which is =TODAY(). Click OK.

Conclusion.

So, we learned how to develop a conditional formatting rule that formats a cell that consists of a date if the date is earlier than today in this course. Also, I examined how to expand our conditional formatting rule to incorporate criteria depending on cells except for the formatted cell.

Conditional Formatting is a useful Excel tool that can be used in a variety of ways to automatically format cells and data depending on both basic and sophisticated criteria.

CHAPTER TEN

UNDERSTANDING AND USING ARRAY FORMULAS

Understanding Array Formulas

An array formula is a method that can perform several calculations on multiple items in an array. An array is a collection of data in a column or row or a collection of data in a combination of columns and rows. Array formulas may give several results or simply one. As you may know, the combination of multiple keys CTRL + SHIFT + ENTER converts a regular equation into an array formula.

Array formulas may be utilized to do complex tasks like:

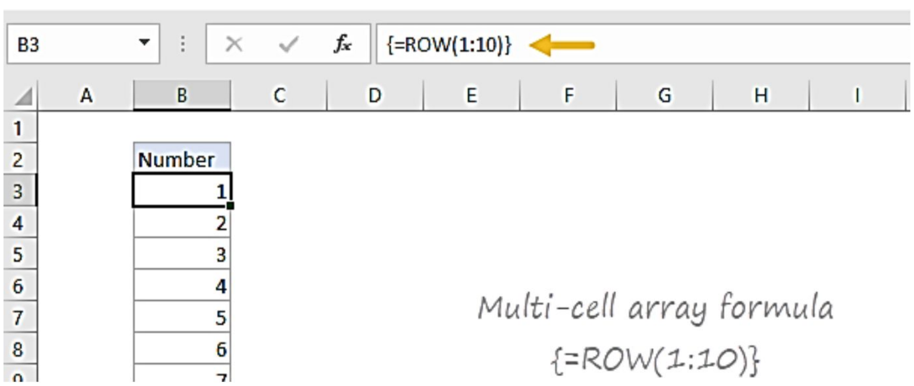
1. Quickly create sample datasets.

2. Count the number of letters in a group of cells.

3. Only include numbers that meet particular requirements, such as those in the lower half of a range or ones that fall between two lines.

4. In a collection of numbers, add up all of the Nth values.

A multi-cell array formula



This is an array formula that returns multiple results to multiple cells at the same time. In the example, the formula for B3:B12 is =ROW(1:10). In this scenario, the ROW function returns a ten-item array: {1;2;3;4;5;6;7;8;9;10}

To enter a multi-cell array formula, follow these steps:

1. Choose several cells to work with, for instance, cells that will contain the formula

2. Enter an array formula in the formula bar.

3. Press Control + Shift + Enter to double-check the formula.

There are a few characteristics that differentiate multi-cell array formulae:

1. All cells have the same formula

2. It is not feasible to insert cells in a range comprising a multi-cell array formula.

3. You must choose the whole range to update the formula.

4. To confirm changes, press Control + Shift + Enter.

To choose each of the cells in a multi-cell array formula, employ the keyboard shortcut control + /.

A single cell array formula

An array formula may create a single cell or a group of cells. A multi-cell formula takes a variety of cell types as input. A single-cell formula, on the other hand, is comprised of an individual cell of an array.

Many Excel array functions, such as TRANSPOSE, TREND, FREQUENCY, and LINEST, are intended to return multi-cell arrays.

When you press Ctrl + Shift + Input to start an array expression into an individual cell, the SUM, AVERAGE, AGGREGATE, MAX, MIN, and related procedures may compute array expressions.

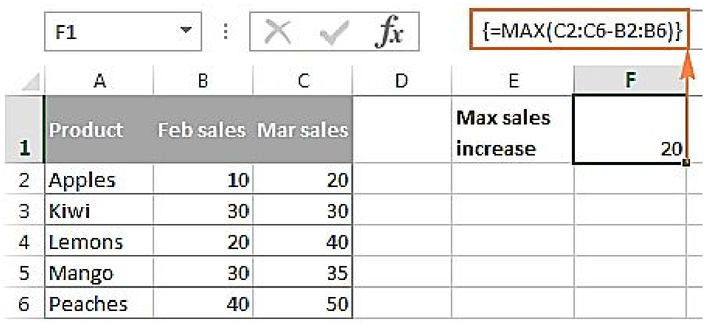
The examples below show how to utilize a single-cell array formula and a multi-cell array formula.

1. A formula for a single-cell array:

Let's say you have got double columns, B and C, which represent the number of items sold in two different weeks, and you desire to figure out which one has the highest rise in sales.

Normally, you'd construct a new column, say column D, that uses a formula like =C2-B2 to estimate the earnings change for each product and then check for the highest figure in that column =MAX (D:D).

An array formula requires no additional column since it appropriately keeps intermediate results in memory. Simply write the following formula and press Ctrl + Shift + Enter:



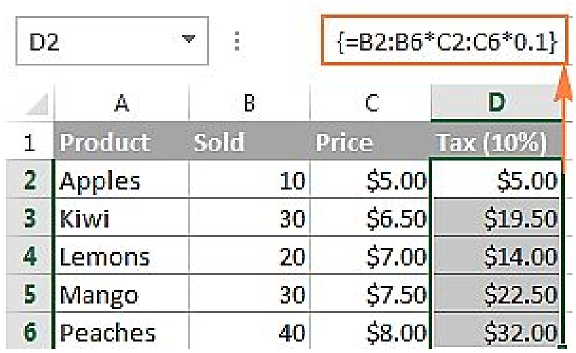
F1 {=MAX(C2:C6-B2:B6)}

	A	B	C	D	E	F
1	Product	Feb sales	Mar sales		Max sales increase	20
2	Apples	10	20			
3	Kiwi	30	30			
4	Lemons	20	40			
5	Mango	30	35			
6	Peaches	40	50			

2. An Excel formula for a multi-cell array:

Assume, as in the previous SUM example, that each sale is subject to a 10% tax, and that you want to calculate the tax for every item utilizing a single formula. In a blank column, choose a cell range, such as D2:D6, and then enter the equation =B2:B6 * C2:C6 * 0.1 in the formula field.

When you press Ctrl + Shift + Enter, Excel will copy your array formula into every cell in the given range, providing you the corresponding result:



D2 {=B2:B6*C2:C6*0.1}

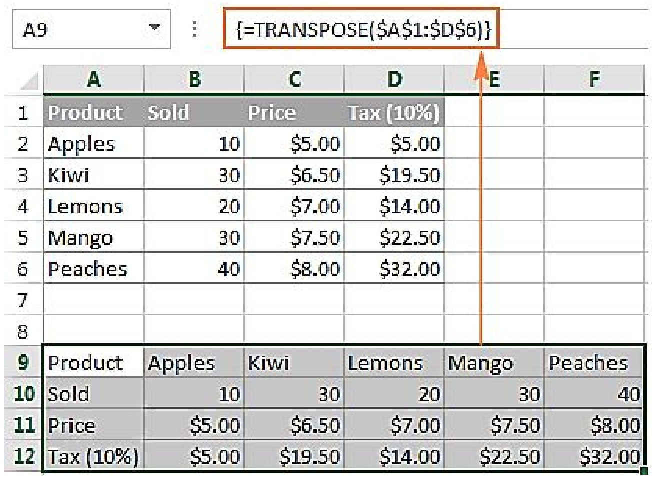
	A	B	C	D
1	Product	Sold	Price	Tax (10%)
2	Apples	10	$5.00	$5.00
3	Kiwi	30	$6.50	$19.50
4	Lemons	20	$7.00	$14.00
5	Mango	30	$7.50	$22.50
6	Peaches	40	$8.00	$32.00

3. Returning a multi-cell array utilizing an Excel array function

Microsoft Excel provides a few "array functions" which are designed expressly for use with multi-cell arrays. TRANSPOSE is among these functions, and we shall use it to reorder the rows in the table above.

Select an empty section of cells for printing the transposed table. Since we'll be changing rows to columns, ensure that you choose the same number of rows or columns as the columns and rows in your source data. In this example, we've used six columns and four rows. Press F2 to enter edit mode.

Insert the array function =TRANSPOSE by pressing Ctrl + Shift + Enter (array). In our situation, the formula is =TRANSPOSE($A$1:$D$6). The final output will resemble the following:



	A	B	C	D	E	F
1	Product	Sold	Price	Tax (10%)		
2	Apples	10	$5.00	$5.00		
3	Kiwi	30	$6.50	$19.50		
4	Lemons	20	$7.00	$14.00		
5	Mango	30	$7.50	$22.50		
6	Peaches	40	$8.00	$32.00		
7						
8						
9	Product	Apples	Kiwi	Lemons	Mango	Peaches
10	Sold	10	30	20	30	40
11	Price	$5.00	$6.50	$7.00	$7.50	$8.00
12	Tax (10%)	$5.00	$19.50	$14.00	$22.50	$32.00

Creating an array constant

In Microsoft Excel, an array constant is effectively a group of static values. When you duplicate a formula to other cells or values, the values of the original cell or value stay unchanged. Let's have a look at some of the various array types and how to create them.

UNDERSTANDING THE DIMENSIONS OF AN ARRAY

One dimensional horizontal array

Each row holds a constant from the horizontal array. To create a constant for a row array, break the values with commas and surround them with braces, as in 1,2,3,4. Note, When creating an array constant, the start and exit braces must be explicitly entered. Create a horizontal array in a spreadsheet by selecting the required amount of blank cells in a row, entering =1,2,3,4 in the formula bar, then hitting Ctrl + Shift + Enter.

One dimensional vertical array

A column holds a constant representing a vertical array. It is constructed identically to a horizontal array, except that the components are divided by a semicolon.

Naming array constants

Assign a name to an array constant to make it easier to use. Consider how it is accomplished:

1. In the Formulas tab > Defined Names group, choose Define Name. Alternatively, when clicking New, press and hold Ctrl + F3.

2. Enter the name in the Name column.

3. In the Refers To box, enter the elements of your array constant, wrapping them in parentheses with the following equality sign (=).

4. Click OK to store the array you specified and close the window.

Select any number of cells in a column or row equal to the number of items in your array. In the formula bar, type the array's name followed by a = sign, and then press Ctrl + Shift + Insert to insert the specified array constant into a sheet.

WORKING WITH ARRAY FORMULAS

Entering an array formula

An array of constants can be made up of numerical data, text elements, Boolean values (TRUE or FALSE), and error values that are separated by a comma or a semicolon. You can enter a numeral in any of the following ways: integer, decimal, or scientific notation, to name a few. In Excel, if you use text values, you should put them inside double quotation marks (") as you might with any other formula.

A constant array can't have any other constant arrays, cell references, ranges, dates, specific names, formulas, or functions in it.

Selecting an array formula

1. Choose the cells in which you want your findings to appear.

2. Begin by entering your formula.

3. Press Ctrl+Shift+Enter three times. Excel inserts the value into every one of the cells you've chosen.

Editing an array formula

1. In the spreadsheet, click the cell that has the array formula.

2. Navigate to the top of the screen and click the formula bar.

3. In the formula bar, change the formula

4. Click the Esc key to quit a formula array without altering it.

5. Press Ctrl+Shift+Enter on your keyboard.

6. From the File menu, choose Save.

Expanding or contracting a multi-cell array

You've constructed a fantastic array formula, and now you're required to input a dozen rows of data to it, and you're discovering that you can't just enter the data into your formula. All you have to do is as follows.

1. Select the region of cells that includes the array formula now in use, as well as the vacant cells beside the new data.

2. Press the F2 key. You may now modify the formula.

3. Substitute the new range of data cells for the old one: For instance, if your previous data ended at cells C11 and D11 and your new data finishes at cells C13 and D13, substitute C13 and D13 for C11 and D11 in the calculation.

4. Press the Ctrl+Shift+Enter combination.

USING MULTICELL ARRAY FORMULAS

Creating an array constant from values in a range

You can enter the array formula in a variety of cells in the spreadsheet, but you do not have to. You may also use array constants that are values that you easily place between parentheses in the formula bar: Then, to make it easier to remember, give your constant a name. Constants may be utilized in array equations or as stand-alone values.

1. Enter an opening brace, the values you desire, and a closing brace in your array formula. Here's an illustration: =SUM(A1:E1*{1,2,3,4,5}). The constant is contained inside the braces (), and yes, those braces are typed manually.

2. Finish your formula by pressing Ctrl+Shift+Enter. The formula will be similar to this: =SUM(A1:E1*1,2,3,4,5)

Performing operations on an array

The operations that an array may do are listed below.

1. **Operation Traverse**: Every element of an array is retrieved precisely once for processing during an array traversal operation. This is also known as array visiting.

2. **Insertion Operation:** Inserting one or even more data elements into an array is called an insert operation. New elements may be made at the beginning, end, or any specified index of the array depending on the necessity.

3. **Deletion Operation**: Deletion refers to the removal of a current element from an array and the reorganization of all array items.

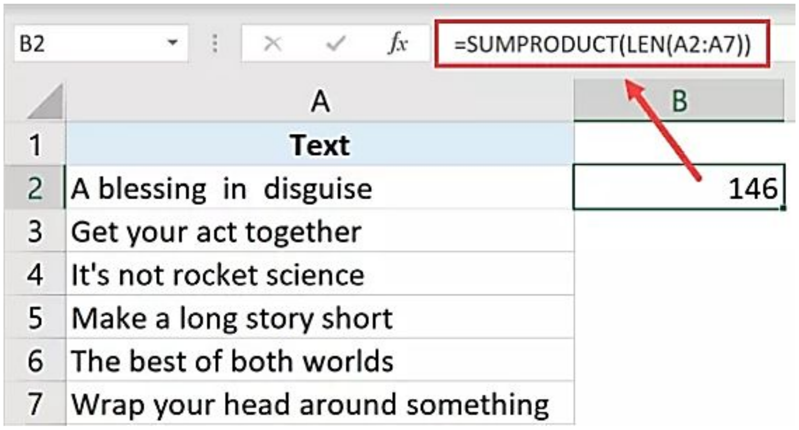
4. **Operation of the Search:** A search for an array element may be done using its value or index.

5. **Update Operation**: An update operation refers to changing the index of an existing element in an array.

Counting characters in a range

The LEN function may also be used to count the overall set of characters in a range. Consider the following scenario: we have the same dataset, but instead of retrieving the number of characters for each cell, we want to know how many there are throughout the whole range.

You may accomplish so by using the formula below: =SUMPRODUCT(LEN(A2:A7))), as also seen in the image below:



Summing the three smallest values in a range

1. Type =SUM(SMALL(A1:D10,1,2,3)) into a blank cell, then press the Ctrl + Shift + Enter keys to receive your result.

2. As n becomes greater, this formula will get complicated. To aggregate the top 20 integers in a range, for example, a formula must have a list of integers ranging from 1 to 20.

Here's a faster and more practical array formula:

LARGE(A1:D10,ROW(INDIRECT ("1:20"))
=SUM(LARGE(A1:D10,ROW(INDIRECT ("1:20"))

Remember to click Ctrl + Shift + Enter after entering this formula. Simply replace 20 with the required amount if you require aggregating a different number of integers.

Counting text in a range

On a Windows machine, perform the following to estimate the cells that contain text in your spreadsheet:

1. To input the formula, click on an "empty cell" in your spreadsheet.

2. To check the number of cells having text within a given cell range, type or paste the function "=COUNTIF (range, criteria)" without quotes.

3. Type the cell range you wish to check in the "range" box. Separate the first and final cells with a colon. Through count cells A2 to A9, for example, type "A2:A9."

4. Type ""*"" in brackets for "criteria." Within the supplied range, this counts the number of cells that contain text. "=COUNTIF (A2:A9, "*")" is an example of a full formula.

5. To apply the formula, hit "enter." The result will appear in the cell of the formula.

Eliminating intermediate formulas

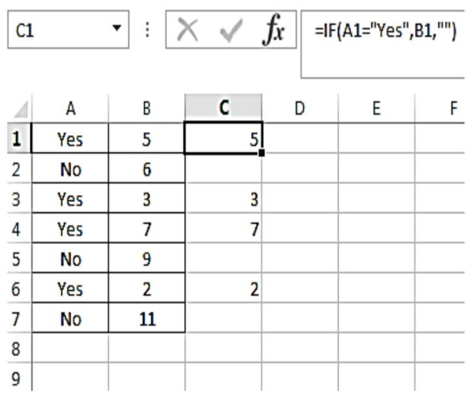
When creating a worksheet with more intricate calculations, rows of data are often employed for intermediate computations before arriving at the final result. It's not unusual for me to have many sheets of this. To avoid things from becoming dirty, you must then conceal the rows or sheets.

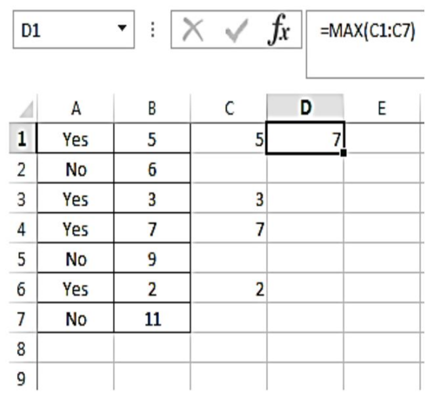
Array formulae, on the other hand, may frequently remove most or all of these intermediary computations. This not only makes your spreadsheet less cluttered but may also help speed it up significantly. This is shown in the example below.

We would compute the greatest value in column B for which there is a matching "Yes" in column A in the example below.

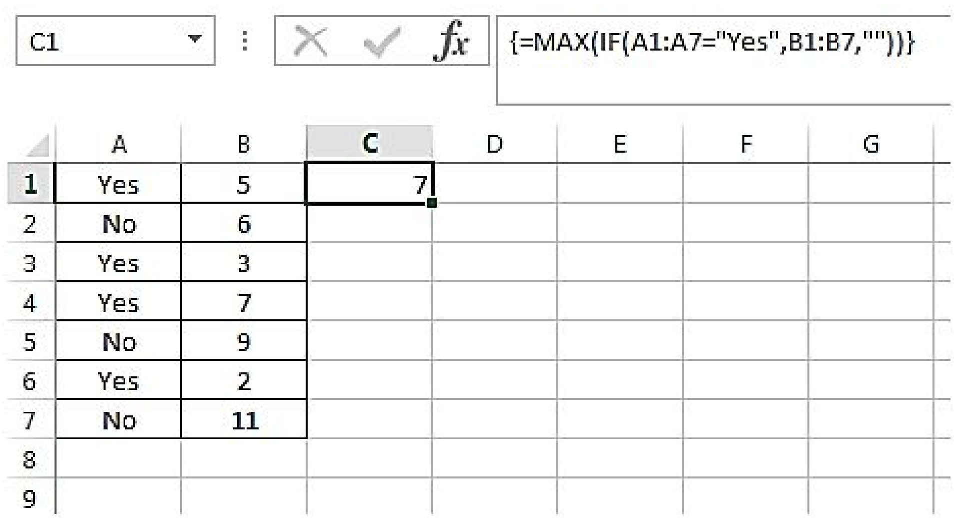
	A	B	C	D
1	Yes	5		
2	No	6		
3	Yes	3		
4	Yes	7		
5	No	9		
6	Yes	2		
7	No	11		
8				
9				

Making column C become an intermediate column that removes the numbers with "No" beside them is one method we could achieve this. We could then calculate the maximum value of the remaining numbers. When I was finished, I would conceal column C.





However, instead of using column C, we could use an array formula, obviating the requirement for it. Converting your single-cell references into the complete ranges is how this works. When you're finished, hit Ctrl-Shift-Enter to get those beautiful brackets around it, which indicates that you're working with an array formula.



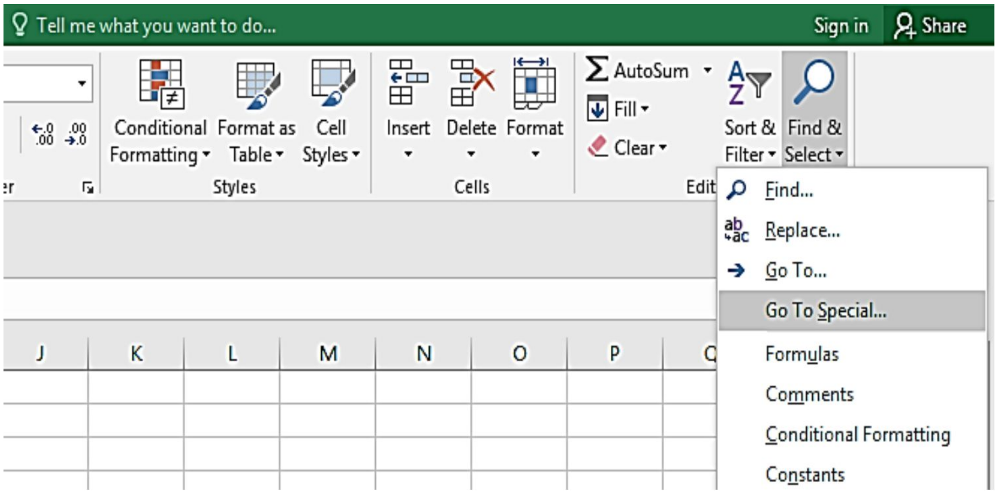
CHAPTER ELEVEN

MAKING YOUR FORMULAS ERROR-FREE

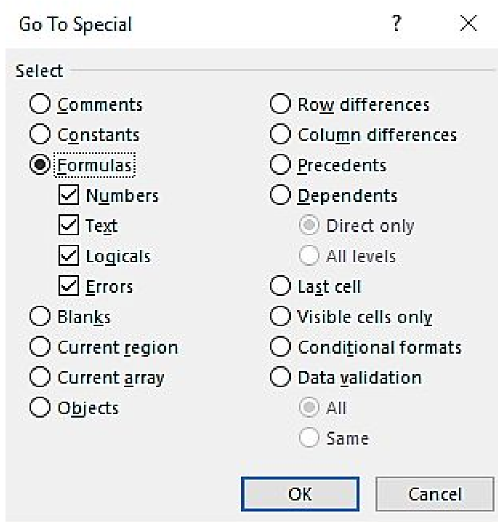
Finding and correcting formula errors

Many Excel spreadsheets include mistakes, which might result in unwanted "intrigues" in certain instances. There are several distinct types of spreadsheet errors: Some of these are obvious, and some are more sophisticated. When you, for example, fail to modify an external data source or duplicate some formulae from the cell underneath rather than the cell to the left. Alternatively, you might wind up numbering certain cells twice, and so on.

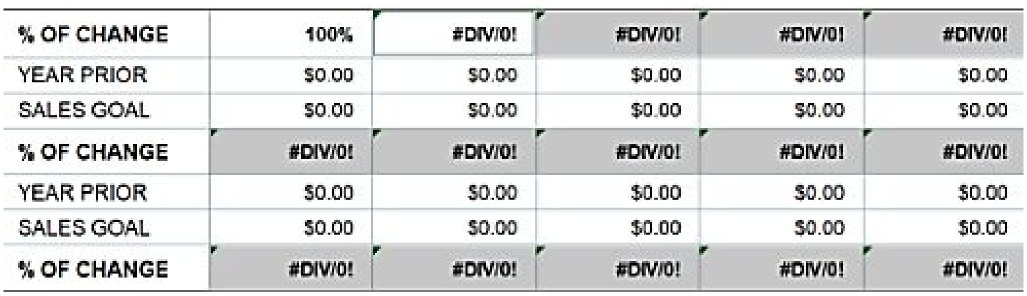
To find errors, pick Find & Select from the home tab. Choose Go to Special.



Select Formulas. pick Check Errors. Then, OK.

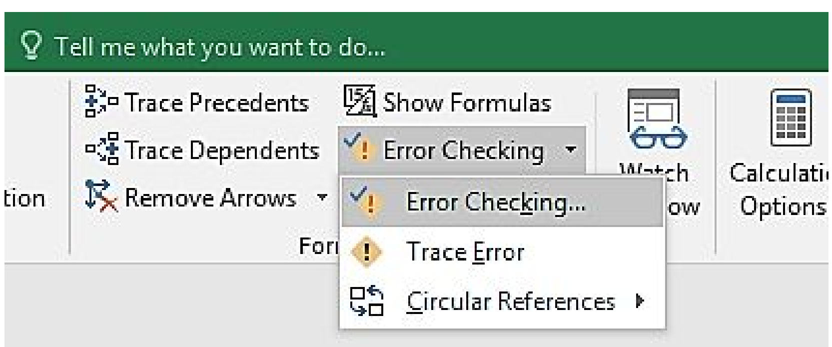


If there are errors in your worksheets, they will be displayed on the screen for you.

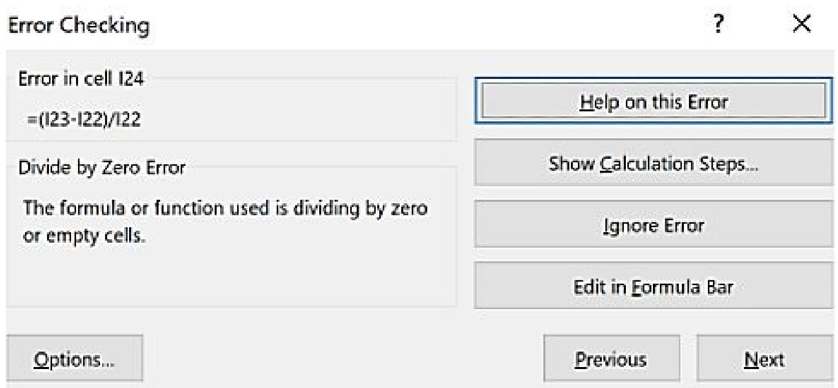


% OF CHANGE	100%	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
YEAR PRIOR	$0.00	$0.00	$0.00	$0.00	$0.00
SALES GOAL	$0.00	$0.00	$0.00	$0.00	$0.00
% OF CHANGE	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
YEAR PRIOR	$0.00	$0.00	$0.00	$0.00	$0.00
SALES GOAL	$0.00	$0.00	$0.00	$0.00	$0.00
% OF CHANGE	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

You can also check errors by using the Formula tab. Click on it and select Error Checking.



Any available errors will be displayed.



Mismatched parenthesis

In every formula in Excel, there is an open and closed parenthesis. Most times, when you start with the open parenthesis, and you don't complete it by closing the parenthesis, Excel does it for you automatically. For instance, you put in this formula =SUM(B5:B78. The formula has a missing parenthesis and that is the closed one. So, Excel will still act without the closed parenthesis.

The problem comes in when there are lots of parentheses in a formula and you do not use it well. When you put a parenthesis in the wrong position, Excel will display an error for you. The formula might have the right number of parentheses but may not be matched well. just like this formula **=UPPER(LEFT(A1))&RIGHT(LOWER(A1), LEN(A1)-**1), it has equal parenthesis but is mismatched. The correct formula is **=UPPER(LEFT(A1)&RIGHT(LOWER(A1),LEN(A1)-1))**

Cells are filled with hash marks

There are two reasons why you may experience this issue. The first is that your cell may not be big enough for the values in it. You can correct this by increasing the size of the cell or you apply another format for the values.

The second reason is that the cell might consist of formula(s) that are invalid such as dates. For instance, you may input a date that is before 1900, which Excel doesn't support. So, any of these will bring up hash marks in the cell.

Blank cells are not blank

Sometimes, when you press the spacebar, you will notice that your cell contents are removed. No, it didn’t go away. When you press the spacebar, there is an invisible character inserted in the cell. For instance, this formula, =COUNTA(A1:A10) will display the number of non-empty cells in range B2:B10. When you press the spacebar to remove any of the cells, the cells will still be added to the count. The formula will display a wrong result.

Extra Space Characters

If your calculations depend on text comparisons, make sure your content doesn't include any extra space characters. When data is transferred from an external source, including an additional space character is quite typical.

Excel eliminates leading spaces from numbers you input automatically, however leading spaces in text inputs are ignored. It's hard to discern if the text has one or many leading space letters solely by glancing at a cell.

Formulas returning an error

There are different errors that formulas in Excel display when you insert the formulas wrongly. Below are the errors that you can get from formulas.

#DIV/0! Errors

It is not possible to divide by zero. When you try to divide by zero in a calculation, Excel shows the classic #DIV/0! error result.

Excel regards an empty cell to be zero, if your formula divides by a blank value, you'll get this error. It is a typical issue when creating formulae for data that hasn't been inputted yet. You can use the IF function to check for any blank cell in your worksheet.

#N/A errors

This occurs when a cell that is referenced by a formula shows #N/A. Most times, people put in the =N/A or #N/A formula for missing data. This issue also occurs when some functions do not find a match to the cell you provided.

#NAME? errors

This error might occur based on these conditions;

- If a formula consists of an undefined cell name or range.
- If it consists of text that is interpreted by Excel as an undefined name. For instance, you may spell a name incorrectly. This error will display.

Range names are a smidge of a stumbling block in Excel. Whenever you remove a name from a cell or range but it's still utilized in an equation, the equation will continue using the name even if it's no more specified. As a consequence, #NAME? appears in the formula. You might assume that Excel will transform the names to their matching cell references instantly, but this does not occur. Excel doesn't even offer a means to transform formula names to cell values!

#NULL! errors

This error occurs when you want to use a formula to join two ranges that do not intersect. When the ranges have no cell in common, this formula will display.

#REF! errors

When you use a formula in an invalid cell reference, this results in this error. This error will display in the following conditions;

- If you erase a cell that has a formula reference in it.
- If you copy a formula to another place that nullifies the relative cell references.

#Value! Errors

This error occurs in the following conditions;

- A function parameter is of the wrong data type, or the formula tries to execute an action with invalid data. A calculation that inserts a variable to a text string, for instance, yields the #VALUE! error.
- The proposition to a function is a range when it could perhaps be only one value.

- There is no calculation for a specific worksheet function. Placing or hanging a sheet in certain versions of Excel may result in this error. To initiate an adjustment, press Control + ALT + F9

Operator Precedence problems

The sequence in which arithmetic calculations are executed in a formula follows certain simple guidelines. Operations with such a less precedence number are executed before those with a larger precedence number in the image below. The image shows that multiplication takes precedence over addition. As a result, multiplication comes earlier.

Symbol	Operator	Precedence
–	Negation	1
%	Percent	2
◦	Exponentiation	3
* and /	Multiplication and division	4
+ and –	Addition and subtraction	5
&	Text concatenation	6
=, <, >, and <>	Comparison	7

Utilize parenthesis to guarantee that actions are done in the right sequence. The formula below multiplies A1 by A2 before one is added to the result. Because it has a greater order of precedence, the multiplication is done first.

=1+A1*A2

This formula is explained in more detail below. The parenthesis isn't required, but the sequence of operations is evident in this example.

=1+(A1*A2)

It's worth noting that the negation operator's symbol is identical to the subtraction operator's symbol. As you may think, this might lead to some uncertainty. Take a look at these two formulas:

=-32% =0-32%

The first formula yields 9, as predicted. The latter, on the other hand, yields 9. How is it that Excel can provide the 9 results while squaring a number always yields a positive result?

In the preceding formula, the negative symbol is a denial function and possesses the greatest precedence. The negative sign, on the other hand, is a reduction operator in the latter formula, and it has lower precedence compared to the multiplications operator. As a consequence, the number 3 is doubled and then deducted from zero, yielding a negative outcome.

When you use parentheses in a calculation like this, Excel interprets the expression as a negative sign instead of a negative operator. This formula yields a result of 9.

=-(3^2)

Formulas are not calculated

If you employ VBA-written custom worksheet functions, you can notice that formulae that use such features don't get calculated, resulting in inaccurate results. Simply, choose the cell, then hit F2, and then Enter to compel a single formula to be computed. If you want to recalculate all the formulas by force, hit Control + ALT +F9.

“Phantom link” errors

Most times, when you open your workbook, you will see a box with this description here written in it, “**This workbook contains one or more links that cannot be updated**”. This description displays when a workbook has no linked formulas. you can change the source of links or update the values again, simply click Edit Links. If you want to leave the links as it is, click Continue.

Using Excel Auditing tools

Excel has lots of functions, formulas, and so on. Sometimes, when entering formulas, functions, and so on, you make some mistakes or do not hear the right answer to the equation you are working on. This issue is why Excel has some other in-built tools that help in auditing the formulas which help them function well. Below are some of the tools and how to use them.

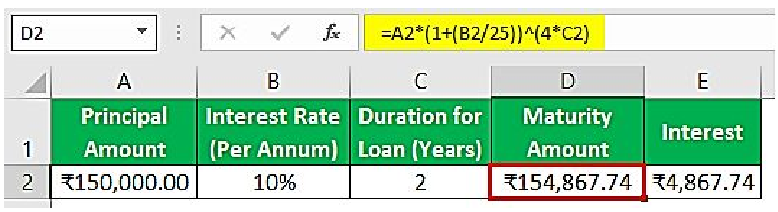
Viewing formulas

The command for viewing formulas is **Control Key + ~.’**. You can also click on Show Formulas on the Formula Auditing Group under the Formula Tab. Select the

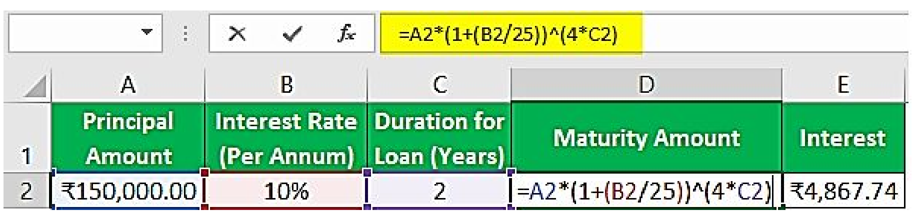
TRACING CELL RELATIONSHIPS

Identifying precedents

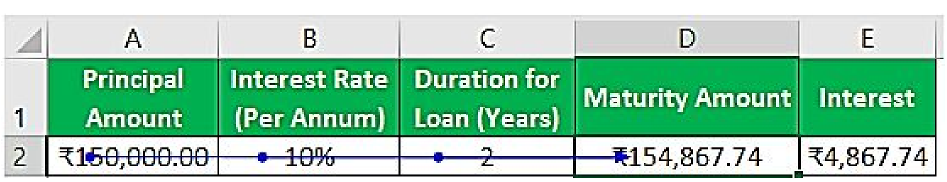
In the image below, I have the highlighted formula in cell D2. So, I want to know the precedents for the formula.



So, press F2. This will get us into the Edit Mode. So, select the cells before pressing F2. The precedence cells will be colored with different colors with the cell reference as well.

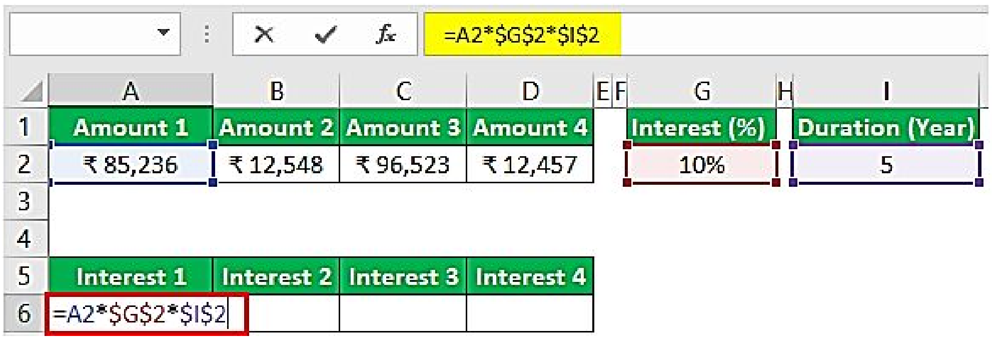


To trace the precedence easily, navigate to the Formula Auditing group and select Trace Precedents. Click the cell that contains the formula and select Trace Precedents. An arrow will be displayed on the cells with dots representing the precedents.

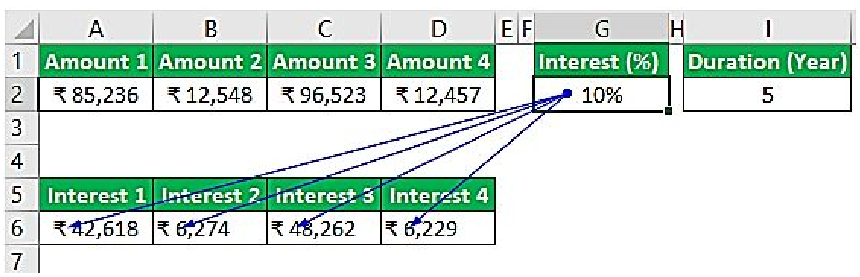


Identifying dependents

This is used in identifying the cell that is depending on another cell. In the image below, different formulas have been applied to the worksheet.



Now, I want to figure out the cells that are depending on cell G2. I will simply choose G2, and then navigate to the Formula Auditing group and select Trace Dependents. The dependents will be shown with arrow signs on them.



Fixing circular reference errors

A circular reference mistake arises when a formula refers to a cell that currently has it, either explicitly or implicitly. As a consequence, the formula dynamically adjusts the previously acquired result, resulting in this sort of mistake. The automated computation will not be done when your worksheet has a circular reference.

Alternatively, you'll have to utilize Excel's error checker to figure out where the circular references are and then eliminate them. When you don’t do so, each cell will be computed in the circular reference with the preceding iteration's findings. Keep in mind that iterating involves continuing the recompilation procedure until it satisfies a set of numerical requirements.

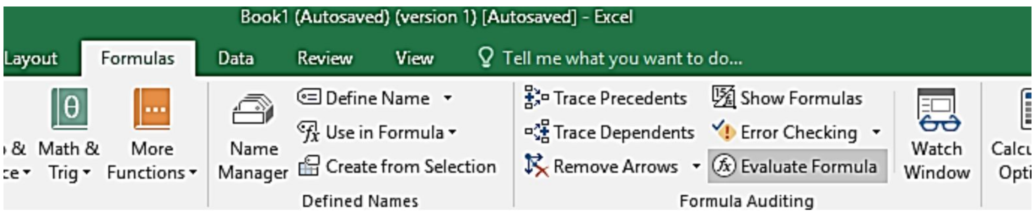
There are ways to solve this issue. You can activate the iterative calculation function. Select File > Options > Formulas > Tick the box on Enable iterative calculation. You can also move the formula to another cell manually. To find the cell that is causing the issue, use the Check for Error option.

Using the background error-checking feature

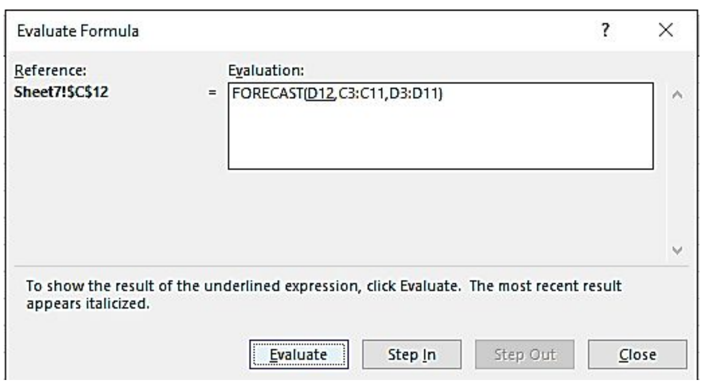
This feature helps you to find errors in your worksheet and it clears them for you. Click on the Formula tab > Error Checking. Then, wipe the Enable background error checking box.

Using Formula Evaluator

This is found under the Formula tab.



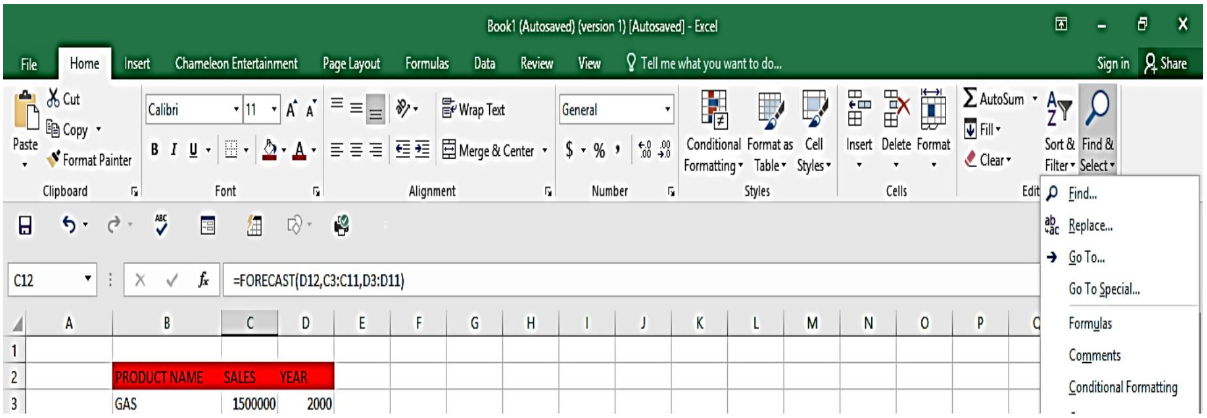
First, pick the cells for the evaluation. Click on the Evaluate Formula. The window will display. Then, click **Evaluate**. This is done to cells that have a formula in them.



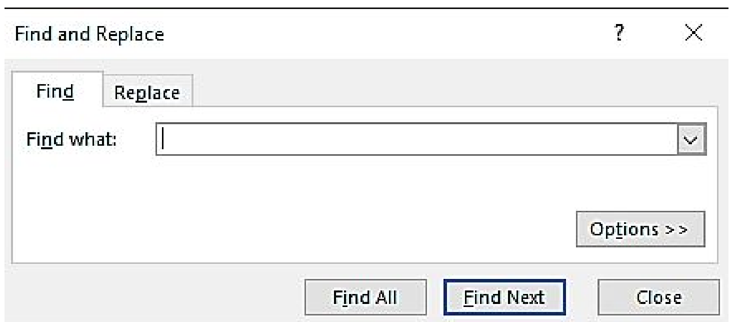
Searching and Replacing

This is done with the find and replace options in Excel. It makes it easier for you to find texts, information, and other things in Excel. You use the find to find the information you are looking for. If you want to replace it, you have to use the find option to find it first before using the replace option.

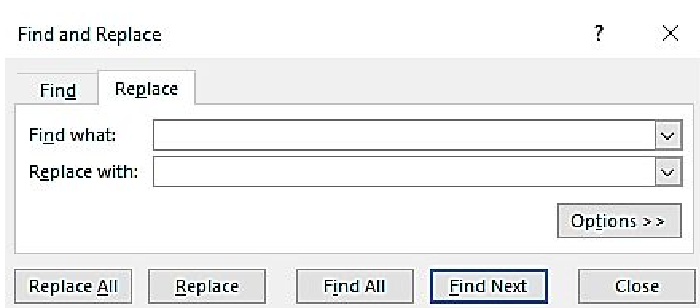
You will find the Find and Replace option and the Editing option on the home tab.



Select Find. Then, type in the word you want to find.

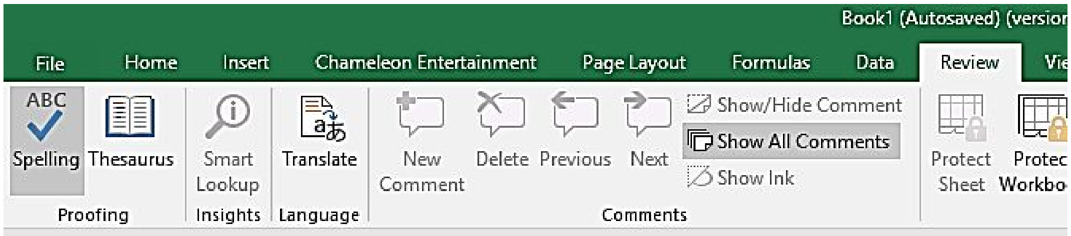


Select Replace. Then, input the word you want to replace in the Find what, and input the word you want to replace it within the Replace with box. Click Replace All to replace all the words in the spreadsheet with the new word.

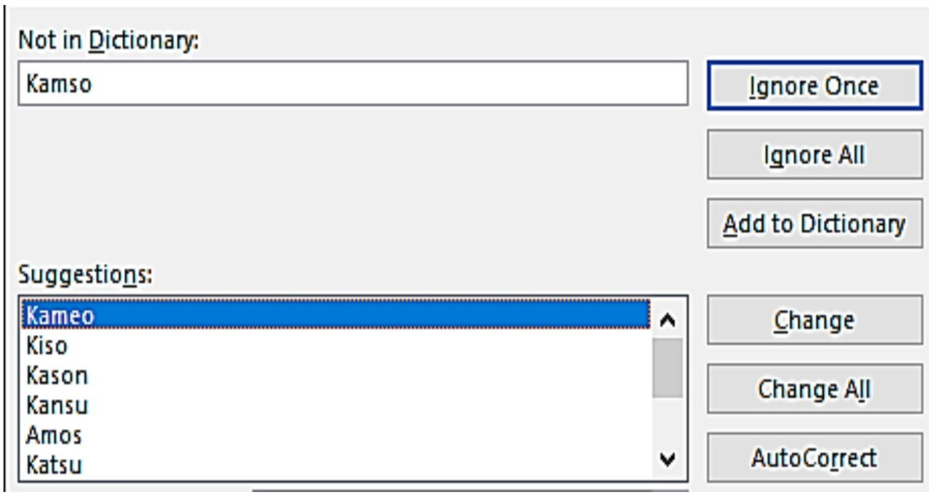


Spell-checking your worksheets

Right-click on any of the sheets below the screen and choose Select All Sheets. Click the Review tab and pick Spelling from the proofing group.



Click Yes on the dialog box. Then, on the box that appears next, you will see the suggested words that are spelled incorrectly. From the suggestion box, select the correct spelling for the word.

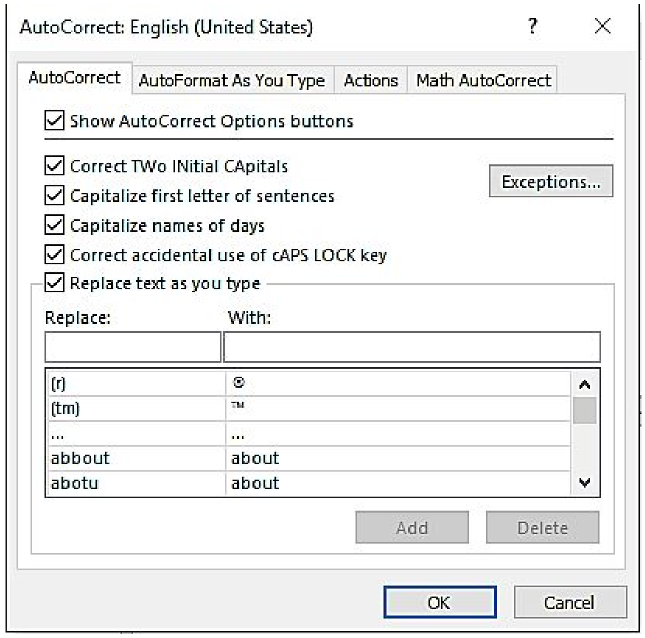


Click change when you are done. Then, unselect the worksheets.

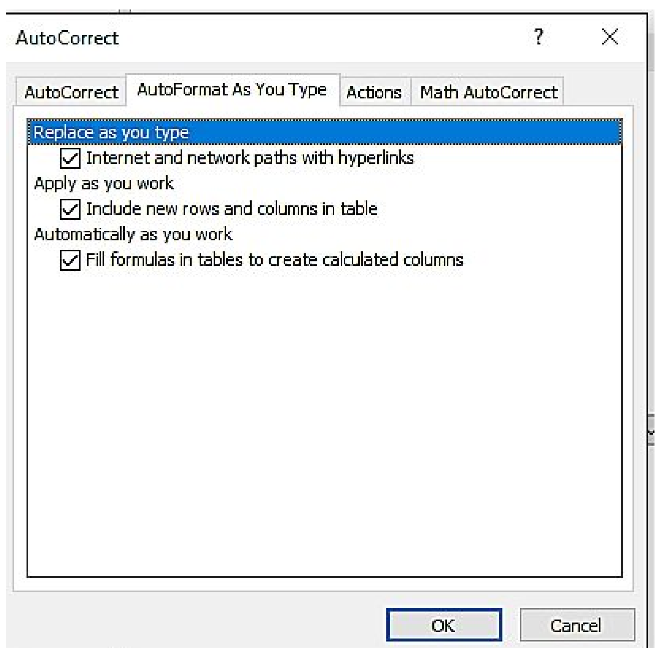
Using Autocorrect

When you are typing in stuff in your cells, Excel sometimes corrects the wordings for you. It helps sometimes but sometimes it may not be what you want. For instance, if you type a web address in a cell, it is changed to a hyperlink. You can modify the settings of the autocorrect in Excel.

Select **File** > **Options**. Click **Proofing** and select **AutoCorrect Options**. The box below will appear.



Click on the AutoFormat As You Type tab. You will see a list of autocorrect options. Check the boxes of the options you want.



Click OK.

BOOK 3:

EXCEL PIVOT TABLES & DASHBOARDS

CHAPTER ONE

INTRODUCTION TO PIVOT TABLES

What are Pivot Tables?

A pivot table is a particular Excel feature that enables you to visually analyze and study data. It is a tool that enables you to interactively study vast amounts of data. With a pivot table, you can rapidly turn a large number of rows and columns into a comprehensive, neatly designed report.

A PivotTable is a user-friendly tool for efficiently summarizing vast volumes of data. A PivotTable may be used to study statistical data in-depth and to solve unexpected queries about your information. A PivotTable is particularly useful for:

- Large volumes of data may be queried in a variety of user-friendly methods.
- Numeric data subtotaling and aggregation, data summarization by categories and subcategories, and custom computations and formulae
- Extending and compressing data levels to narrow your findings, as well as diving down to specifics from data collected for fields of interest to you.
- To view alternative representations of the original data, move rows to columns or columns to rows (or "pivot").
- Filtration, sorting, grouping, and conditional formatting are the most relevant and intriguing subset of data, allowing you to concentrate on just the information you need.
- Reports that are succinct, beautiful, and annotated may be presented online or in print.

In essence, Pivot Table extracts value from the infinite clutter of data on your computer. And, more particularly, it allows you to organize your data in various ways so that you may readily make useful conclusions.

The "pivot" aspect of a pivot table refers to the ability to twist (or pivot) the data in the worksheet to examine it from a wider viewpoint. To be clear, when you pivot, you are not adding to, removing from, or otherwise affecting your data. Rather, you're merely restructuring the data so that it may be mined for important information.

What are the main parts of a Pivot Table?

Filters: A report filter is used to apply a filter to a table as a whole. Filters are used to conceal certain data.

Columns: Column labels are used to add a filter to one or more columns in the pivot table that must be shown. Values under various situations

Rows: Row labels are used to add a filter to one or more rows in the pivot table that must be shown. Data that is used to specify something.

Values: This generally takes the form of a field with numerical values that may be utilized for various sorts of computations. The total number of data points.

Importance of Pivot Table

When working with data in Microsoft Excel, there are several tools and features available. Pivot tables are an essential feature of Excel that allows you to work with data in several ways. Pivot tables are useful because they enable anybody to filter and retrieve information from the data set, they're working with.

Pivot tables enable anybody to see their data from a variety of angles. Users may construct interactive visualizations for anybody viewing them with the help of these pivot tables.

You may construct a pivot table after the data is in Excel. To create a pivot table, highlight all of your data, go to the Insert tab, and choose Pivot table from the drop-down menu. The Pivot Table option gives the user the maximum flexibility with their data, allowing them to investigate all conceivable combinations of their categories. If the user wishes to have Excel present some pivot tables already built with their data, they may click the Recommended Pivot Tables option.

The pivot table dashboard will appear in a new excel sheet once you click OK, and the user will be able to examine all parts of the data.

When the user begins adding items to the filters, rows, columns, and values sections on the right side of the dashboard, the numbers appear on the left side of the dashboard. All of the data's columns appear in the box, and they may be dragged and dropped into any of the four categories.

If you drag anything into the rows field, it will display all of the data from that column in rows on the left side. The same is true if you drag anything into the column field; only the data will appear in columns across the page.

The values field enables the user to get and display data linked with categories in the rows or columns. Finally, the filter field is quite valuable because it allows for the user to split down the data so that they may only view the bits of it that are relevant to them. To the left is a representation of these pivot tables' fundamental functions.

Another useful feature of pivot tables is the large number of functions that can be applied to the data in the columns and rows in real-time.

The pivot table's values may be translated in many ways. The lists on the left are just a few of the many methods to extract essential values from data quickly. Users may retrieve the total amount of numbers in a category, the count, and other statistics that can be utilized to locate crucial data.

If a user wants to make calculations from the data in a column right away, they can do so with just one click on each cell. Instead of typing long formulas into each cell, pivot tables allow you to perform calculations that would otherwise necessitate a long formula in each cell.

Creating a new field calculated from a function made up of other fields is another intriguing possibility with pivot tables. A user can manipulate different fields in a pivot table by adding, subtracting, multiplying, and dividing them.

Conclusion

This chapter simply explained what a pivot table is all about. As you were reading through, you got to know about the meaning, parts, and importance of a pivot table. With a pivot table. You can efficiently carry out several tasks.

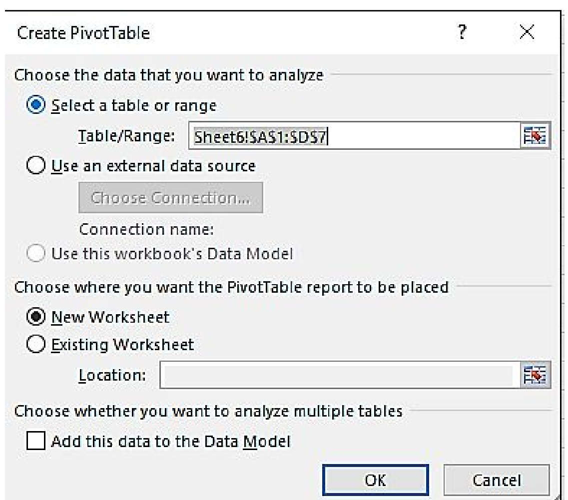
CHAPTER TWO

BUILDING A BASIC PIVOT TABLE & CHART

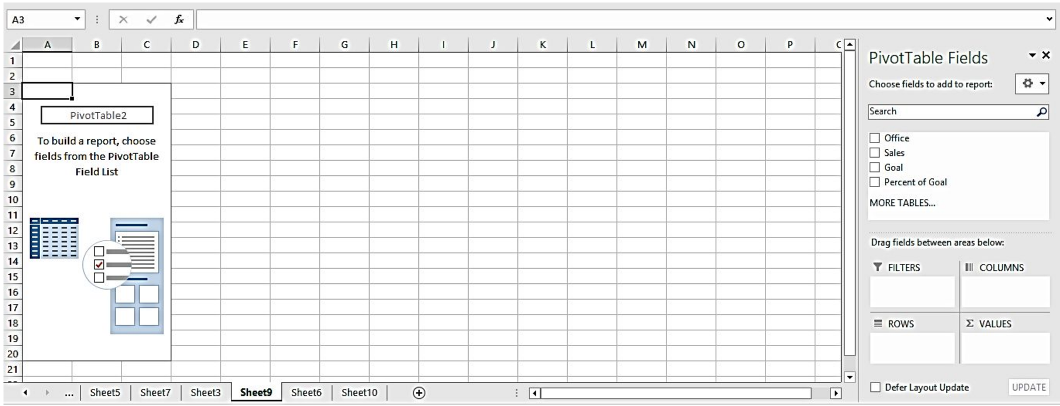
A PivotTable may be created from a set of data or an Excel table. If you know what you're searching for, you may start with a blank PivotTable to add in the specifics. You may also utilize Excel Recommended PivotTables to get an idea of which PivotTable layouts are most appropriate for summarizing your data. It is an easy process to create a Pivot Table in your worksheet. Follow the steps below to do so;

First, choose the cells for the pivot table:

Navigate to the Insert tab and select Pivot Table. Select where you want the pivot table to be placed. Click **Ok**. It is advisable to pick a New Worksheet. You can also decide to analyze multiple tables by clicking the boxes on Add this data to the Data Model.



The Pivot table will be created on your worksheet in relation to the data in your new worksheet. It will consist of an empty worksheet. Name the worksheet.



Summarizing Numbers

Excel provides several techniques for summarizing your data in the Pivot table. Sum, Count, and Average are some of its summary capabilities.

If you insert a field in the Values section of the field list pane, the value in the column is instantly summed. The Sum function is the standard summary function for the PivotTable's arithmetic value fields, but you may change it.

- In the PivotTable, on the Grand Total field, right-click on it and select Summarize Values By.
- Choose the function that you want to use from the drop-down menu.

Below are the summarize options that you can use alongside the function.

SUM: The standard adding function. It adds up the details in the column. It is the basic function for numerical value fields in value fields. When the sum method is used, all empty or non-numeric variables in the PivotTable are set to 0 so that they may be totaled.

COUNT: It shows the total number of non-empty values. It is the standard value for value fields that include non-numeric data or spaces.

AVERAGE: With this, the average of the provided data is shown.

MAX: With this, the highest value is shown.

MIN: With this, the lowest value is shown.

PRODUCT: With this, the composite of the values is shown.

StDev: An estimation of a population's standard deviation, when the sample represents a portion of the total population.

StDevp: The population standard deviation, in which the population is all the other data to be summed.

VAR: It provides an estimation of a population's variation, where the sampling is a portion of the full population.

VARP: It shows the variation of a population, in which the population is the total amount of data to be evaluated.

Distinct Count: It shows the number of distinct values. This summary feature is only available in Excel when you utilize the Data Model.

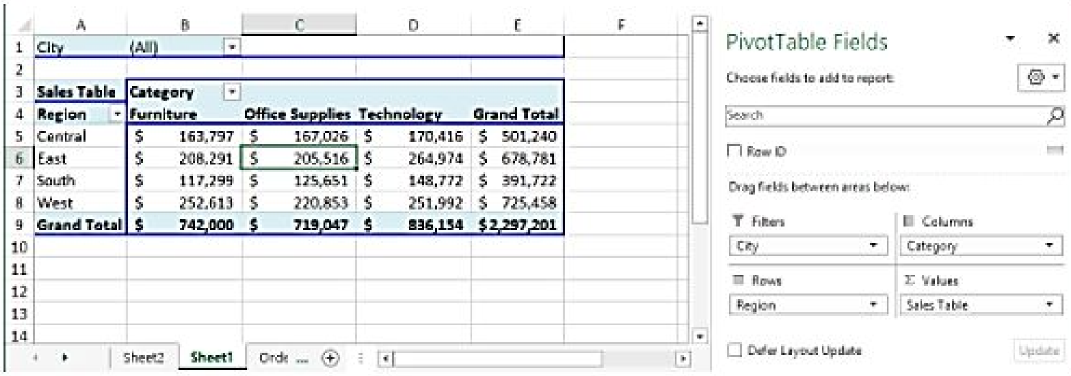
How to Drill-Down Pivot Table Data

Particularly when it comes to data analysis, pivot tables are our best friends. Let's look at how a table's structure develops. One or more records may be found in each value.

Let's have a look at an example of this. When it comes to passport IDs, one ID may belong to just one individual, which is referred to as a 1:1 relationship. If we're talking about a birthdate, the 1: N relationship comes into play. More individuals can easily tolerate it on the same day, as we can see.

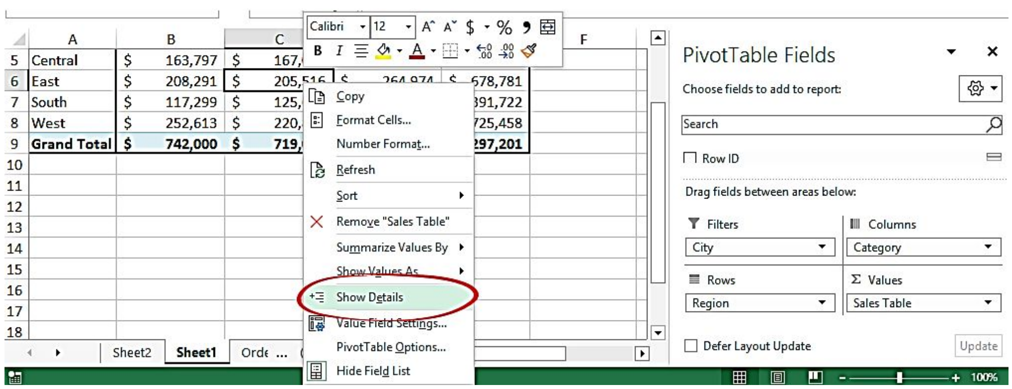
Let's return to the original data set after this little diversion. A sales table is seen in the diagram below. At first sight, the number in cell C6 (East / Office Supplies) does not provide much information.

To find out all the specifics, we are using the drill-down tool!



In Excel, we should design a dashboard using the drill-down approach. We've summarized the data by regions and categories in the sample below. We'd want to see all of the cell C6's connected records.

To begin, choose one of the data-filled columns in the Pivot table. Right-click the highlighted cell after that. Finally, choose "Show Details" from the drop-down menu that appears.



Tip: There is a much quicker way to do the drill-down than using the Show Details command. We'll highlight the cell value we'd want to go through in more depth. It's finished after two clicks!

A new worksheet with a list of 'Office Supplies' entries will be created instantly.

	A	B	C	D	E	F	G	H	I	
1	Row ID	Order ID	Order Date	Ship Date	Ship Mode	Customer ID	Customer Name	Segment	Country	City
2	9986	CA-2015-100251	5/17/2015	5/23/2015	Standard Class	DV-13465	Dianna Vittorini	Consumer	United States	Long I
3	9985	CA-2015-100251	5/17/2015	5/23/2015	Standard Class	DV-13465	Dianna Vittorini	Consumer	United States	Long I
4	9982	CA-2017-163566	8/3/2017	8/6/2017	First Class	TB-21055	Ted Butterfield	Consumer	United States	Fairfie
5	9970	CA-2017-153871	12/11/2017	12/17/2017	Standard Class	RB-19435	Richard Bierner	Consumer	United States	Plainf
6	9969	CA-2017-153871	12/11/2017	12/17/2017	Standard Class	RB-19435	Richard Bierner	Consumer	United States	Plainf
7	9968	CA-2017-153871	12/11/2017	12/17/2017	Standard Class	RB-19435	Richard Bierner	Consumer	United States	Plainf
8	9967	CA-2016-146374	12/5/2016	12/10/2016	Second Class	HE-14800	Harold Engle	Corporate	United States	Newa
9	9966	CA-2016-146374	12/5/2016	12/10/2016	Second Class	HE-14800	Harold Engle	Corporate	United States	Newa
10	9964	CA-2015-143700	7/26/2015	7/26/2015	Same Day	AS-10240	Alan Shonely	Consumer	United States	Philad
11	9959	US-2014-143287	11/11/2014	11/17/2014	Standard Class	KN-16705	Kristina Nunn	Home Office	United States	New F
12	9958	US-2014-143287	11/11/2014	11/17/2014	Standard Class	KN-16705	Kristina Nunn	Home Office	United States	New F

Sheet2 | Sheet3 | Sheet1 | Orders | Returns | ...

When utilizing slicers, use extreme caution!

When we link slicers, namely filters, to the Pivot table, we might get some unexpected results. In Excel versions before 2016, utilizing the drill-down feature with slicers might result in incorrect results!

However, Excel's newest versions, they're worth using, particularly when we want to further filter the table's data before drilling down. Click the Insert tab and pick the Slicer symbol to add a new slicer.

The slicer in the image below has all of the categories. All components will be in the list if we want to calculate the Grand Total in the E5 cell.

	A	B	C	D	E
1	City	(All)			
2					
3	Sales Table	Category			
4	Region	Furniture	Office Supplies	Technology	Grand Total
5	Central	$ 163,797	$ 167,026	$ 170,416	$ 501,240
6	East	$ 208,291	$ 205,516	$ 264,974	$ 678,781
7	South	$ 117,299	$ 125,651	$ 148,772	$ 391,722
8	West	$ 252,613	$ 220,853	$ 251,992	$ 725,458
9	**Grand Total**	**$ 742,000**	**$ 719,047**	**$ 836,154**	**$ 2,297,201**

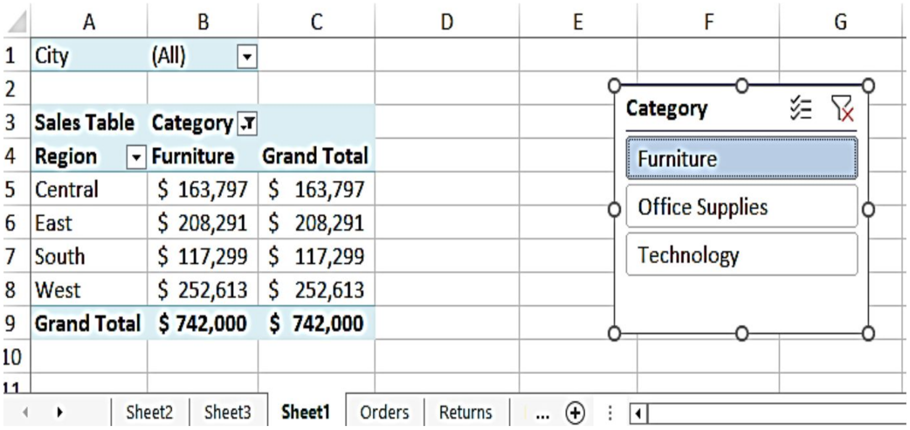
Category

Furniture

Office Supplies

Technology

Do you want to see just one category before drilling down? Select a category by clicking on its name.



When we double-click the B5 cell, just the records from the highlighted category are shown.

Watch out for the source data

Whenever we deal with data that isn't tied to the actual source or the Pivot table, it's far more annoying. What occurs if the Pivot table's new data arrives?

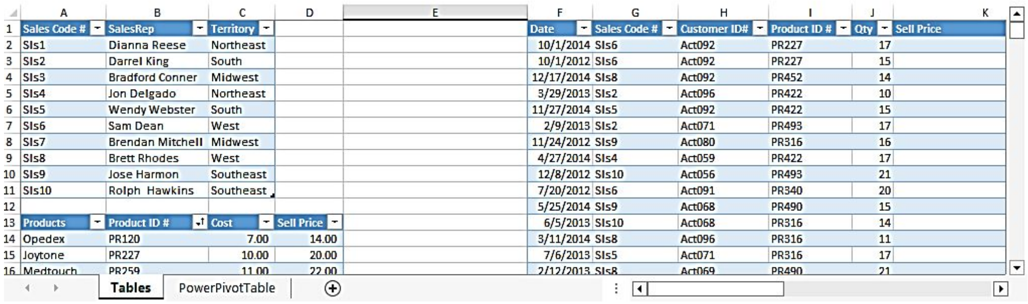
Let's look at the analyst's worst disaster: data that isn't refreshed! When we utilize an external data source, this is quite simple to happen.

We can't stress enough that when we utilize the drill-down function, all we get is a stagnant list. This isn't tied to the initial Pivot table anymore!

Drill-down PowerPivot Data Model

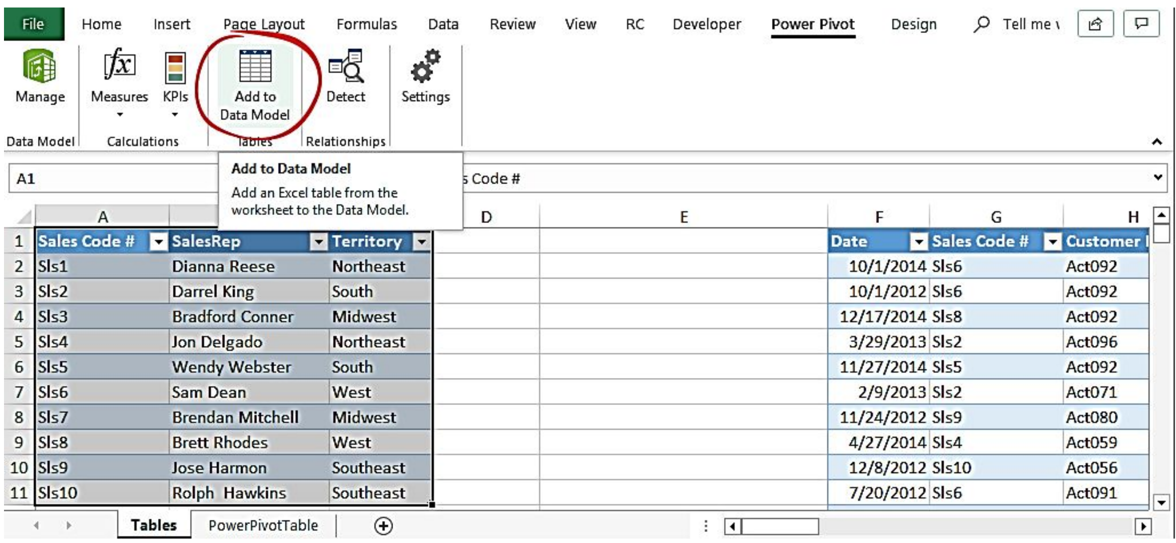
We'll teach you how to create a tiny data model using tables and PowerPivot in this segment. You may also obtain an insight into the Quick Explore tool with only a few taps. If you want to delve down into the specifics in Excel, Quick Explore is the way to go. It's important to note that this feature requires Excel 2013 or later.

On the Tables worksheet, we have sales-related datasets.

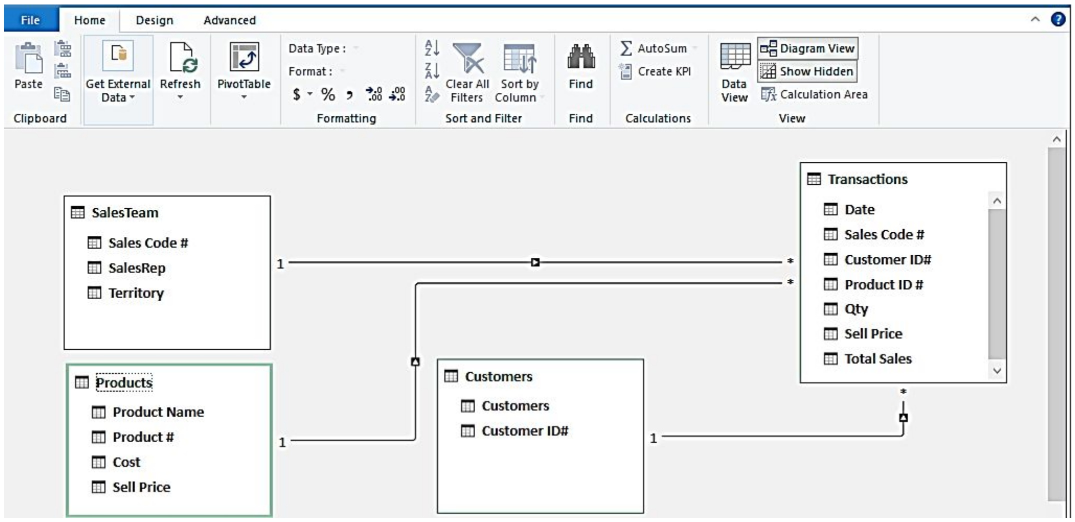


Let's start by establishing table connections.

Insert the specified table first from the Worksheet to the Data Model after selecting the range.

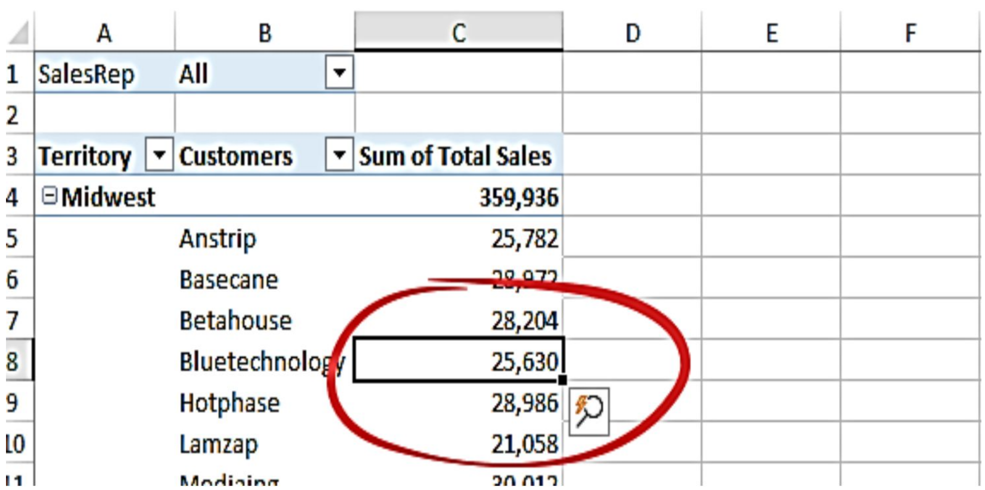


In PowerPivot, choose the Manage option. That's a sandstone Excel add-in for data analysis. We'll construct a Data Model that includes the following connections between the sales tables:

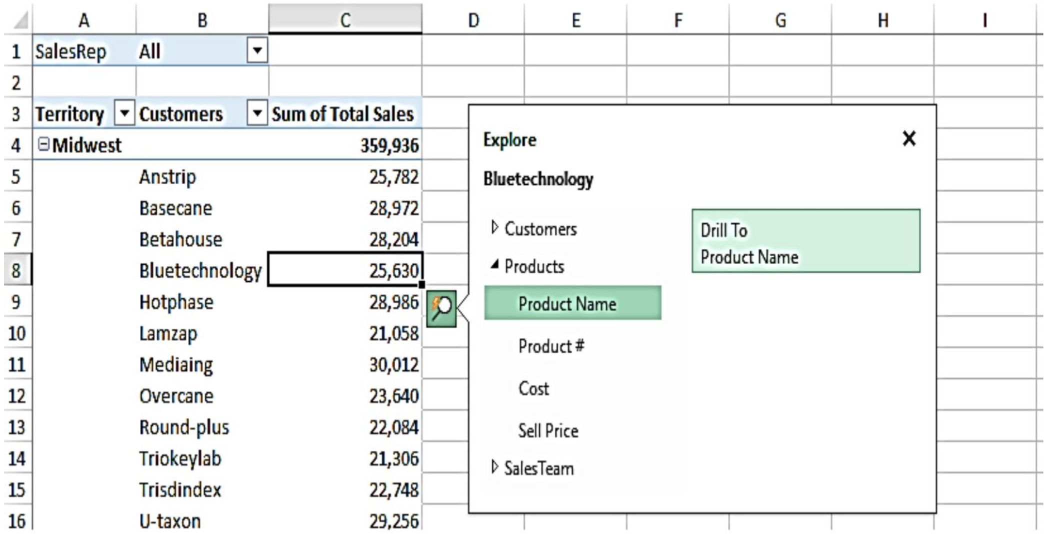


Build a pivot table using the data from the source tables. Select the PivotTable symbol in the PowerPivot pane. A new Worksheet will be created to describe and organize the design.

Select a data-filled cell on the new worksheet! The symbol for Quick Explore now shows.



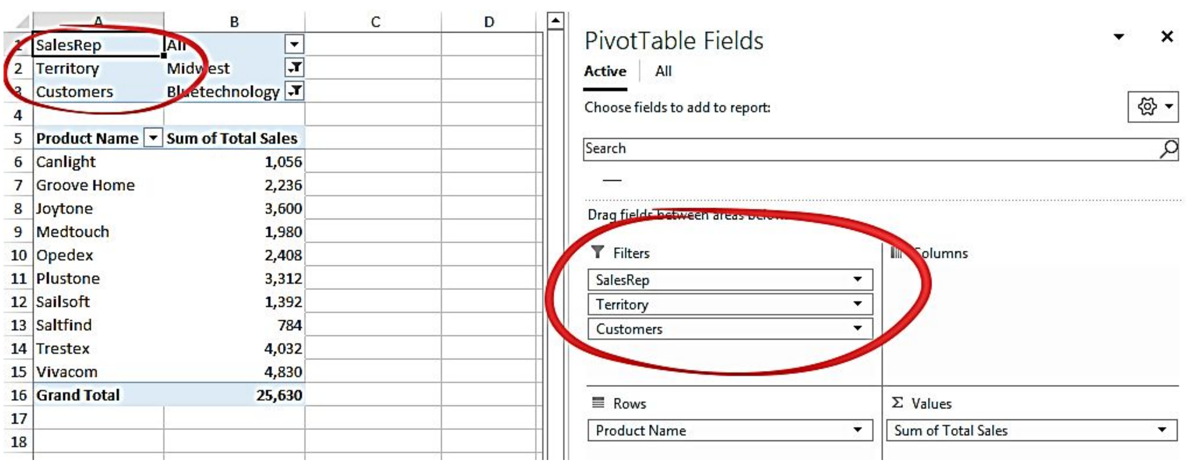
Select the icon. The Explore area will appear on the screen. The Pivot Table's tables are shown in the pop-up pane. You may drill down deep using any of the available choices.



Select the symbol for Quick Exploration. A pop-up panel called Explore emerges. This panel displays all of our Pivot Table sales tables.

To drill down deeper into the information, choose one of the available fields. We wish to select the required product names from cell C8 in this case.

Customers of Blue Technology in the Midwest will get a value of $25630. On the Explorer window, select this option.



Excel will construct and alter the Pivot table. Check out the filters in the top-left area. The pivot table has been reorganized to display information about the chosen cell.

Is it necessary to reorganize the layout? To restore your default table structure, use Control key + Z on your keyboard.

It is beneficial for anyone to look beyond the exterior. In circumstances when we need to dig down to the base of the data sets and inspect the specifics, it is achievable. The drill-down approach is our ally in this approach. When dealing with enormous data tables, utilize this function with caution since there's a lot to learn with little investigation.

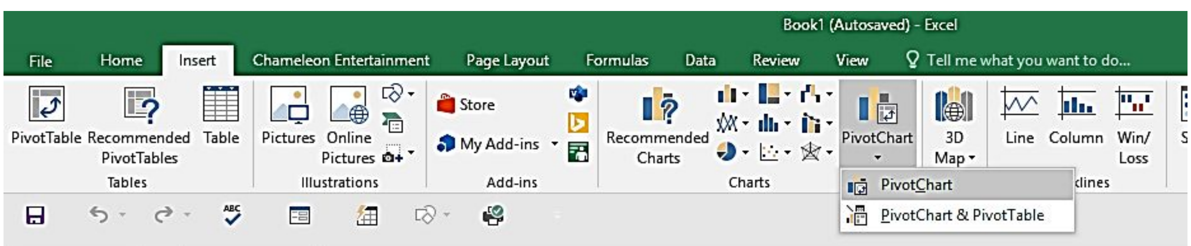
Adding Additional Rows (categories) to your Pivot Table

- On your worksheet that contains the PivotTable, then, click on any of the cells in the pivot table area to open the Pivot Table Wizard.
- Choose the column label selected. Then, drag and drop it into the Row Labels section.
- Now, rearrange the field labels in the Row Labels section. You will see some modifications on the Pivot Table. Choose how you want to order the row labels.
- Review the Page Layout for the worksheet.

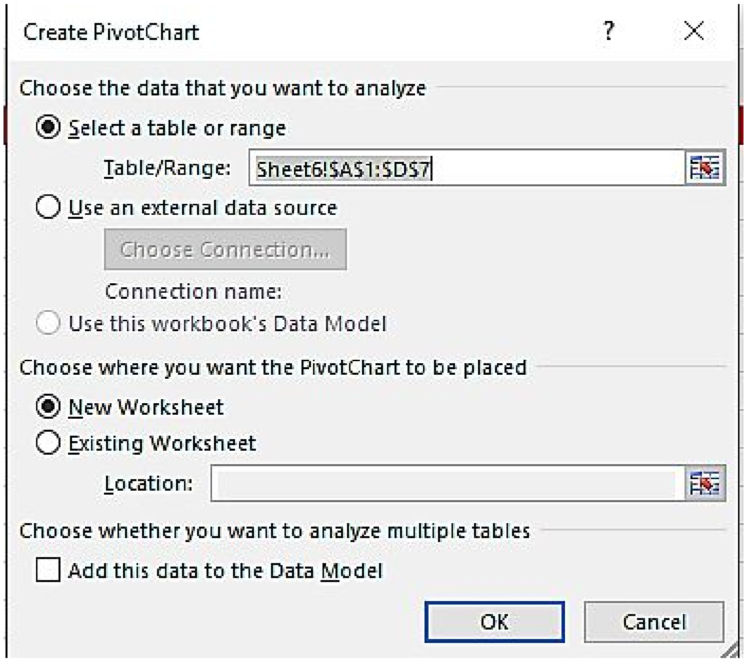
Charts: How to create a basic Pivot Table Chart

A normal chart makes use of a variety of cells, but a pivot chart is formed based on the data summarized in a pivot table. A pivot chart is essentially a dynamic chart, however, converting a regular chart to a dynamic chart requires data adjustments.

To create the chart, simply choose the cells in your worksheet. Navigate to the Insert tab, then pick Chart before choosing Pivot Charts.



A menu will appear which will contain the cells you have selected. Choose where you want the chart to be placed. You can Use an External Source if you want to create the Pivot Chart from another source.



Pick Ok.

Pivot Chart has four elements just like a pivot table which are Axis, Legend, Values, Report Filter.

Conclusion

This chapter explained all about the steps in building a basic pivot table and chart. It examined how to summarize numbers, add additional rows to your pivot table, drill down your pivot table, and lots more. With what you have read, I know you understood it all.

CHAPTER THREE

DISPLAYING PERCENTAGES

Several designed percentage calculations are available in the Pivot Table's "**Show Values As**" option. We would like to understand how to evaluate quantities in calculations using Pivot Table percentages rather than Totals in a sales collection of various cigarette brands in various locations.

Percentage of Grand total

To evaluate each number to the grand total value in Pivot Table percentages, we utilize the percent of Grand Totals computation. Branding is put in the Row area, Areas in the Column area, and Sales Amounts in the Value area of our Pivot Table. We wish to compare the proportion of each brand's sales in each location to the total sales of all brands across all regions. To alter the sales amount of each brand as a percentage of the Grand Total, we perform the following:

1. Click the right mouse button on any of the brand's sales amount cells.
2. Select Show Values as
3. Choose Percentage of Grand Total

Percentage of Column Total

The percentage of Column Total calculation compares every value to the total of a column value and displays the result in Pivot Table percentages as a percentage of column total. To display the proportion of sales for each brand inside each area, just do the following steps in your Pivot table:

1. Select any of the brand's sales amount cells using the right mouse button.
2. Pick Show Values As

3. Choose the percentage of Column Total from the Show Values As drop-down menu.

Use this same method to display the percentage of the row total as well.

Conclusion

So, I have given you the concept of how to display percentages in your pivot table. You can display the grand, row, and column percentages. Use the methods here to make it easier for you to display percentages.

CHAPTER FOUR

RANKING RESULTS AND DISPLAYING AVERAGES

A Pivot Table is Excel's greatest useful means, that enables you to evaluate your data in a variety of ways with the click of a button. You may also use the Average instead of the Sum in a Pivot Table!

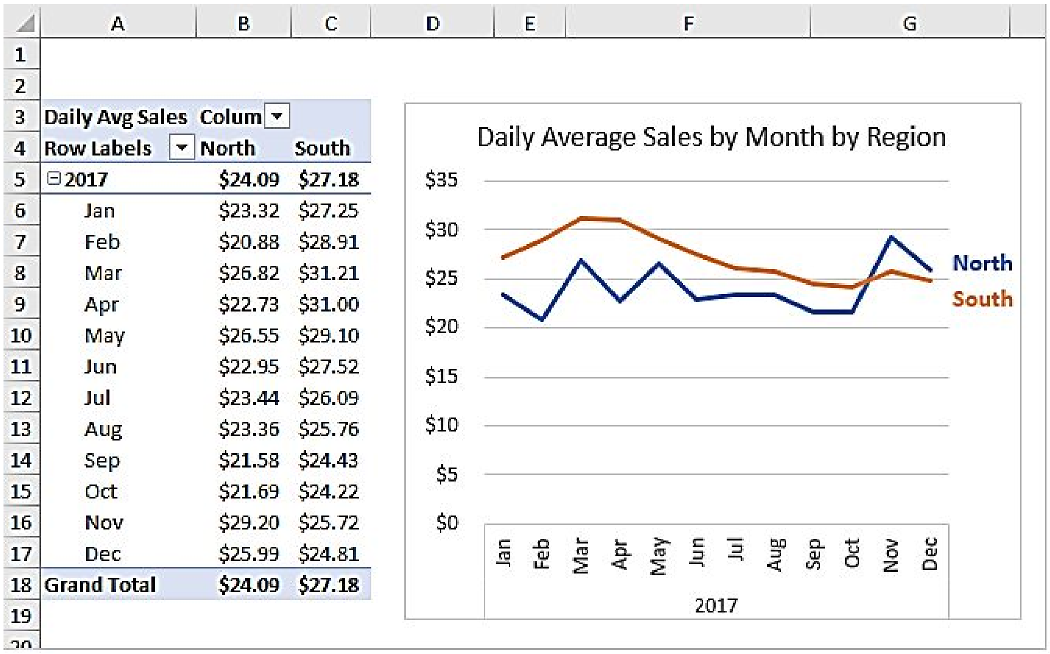
You may pick a kind of computation (Sum, Count, Average, Max, Min, Count Numbers) when using the **Summarize Values By** option.

Whenever you place a value field into the Pivot Table's Values box, it will automatically sum it and give you a Summation of the Values.

This computation may simply be changed to an Average and that will display the Excel pivot table mean scores for your dataset.

Displaying Averages

The estimated daily measure is helpful for analyzing patterns in daily sums over time (monthly, halves, etc.) or even divisions. To rapidly understand how the daily average varies over time, we may utilize a line chart or a column chart.



Daily Avg Sales	Column Labels	
Row Labels	North	South
⊟2017	$24.09	$27.18
Jan	$23.32	$27.25
Feb	$20.88	$28.91
Mar	$26.82	$31.21
Apr	$22.73	$31.00
May	$26.55	$29.10
Jun	$22.95	$27.52
Jul	$23.44	$26.09
Aug	$23.36	$25.76
Sep	$21.58	$24.43
Oct	$21.69	$24.22
Nov	$29.20	$25.72
Dec	$25.99	$24.81
Grand Total	$24.09	$27.18

How does this calculation work?

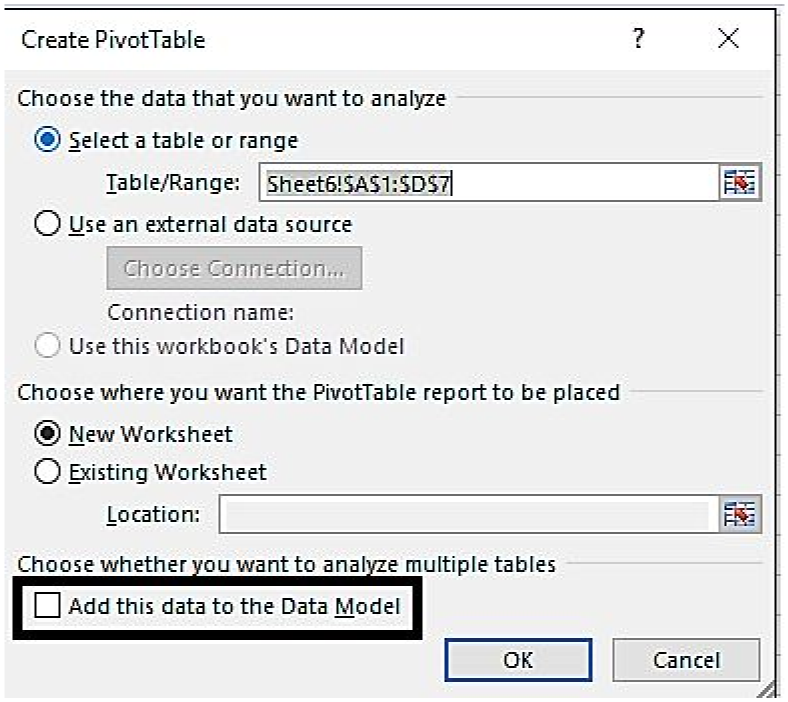
The Power Pivot Data Model employs DAX measurements in this method. To compute the original time duration in the data collection, we'll utilize the DISTINCTCOUNT function. In Power Pivot, the DISTINCTCOUNT function is a DAX function.

The Average of Total Daily Sales is calculated by dividing Total Sales by the Distinct Day Count. This might be any amount (numeric value). It is not required that the data come from sales.

Formula = [Average of Total Daily Sales] = [Total Sales]/[Distinct Day Count]

Below are the procedures in creating pivot tables and measures (showing average):

1. The first step is to insert a Pivot Table and add it to the Data Model. When inserting the pivot table, click on the box next to the Add this data to the Data Model option.



2. The next step is to construct the measures. For three computations, we'll define explicit measures:

Total Sales = SUM((Amount)), Distinct Day Count = DISTINCTCOUNT((DATE)), and Daily Average = (Total Sales) / (Distinct Day Count).

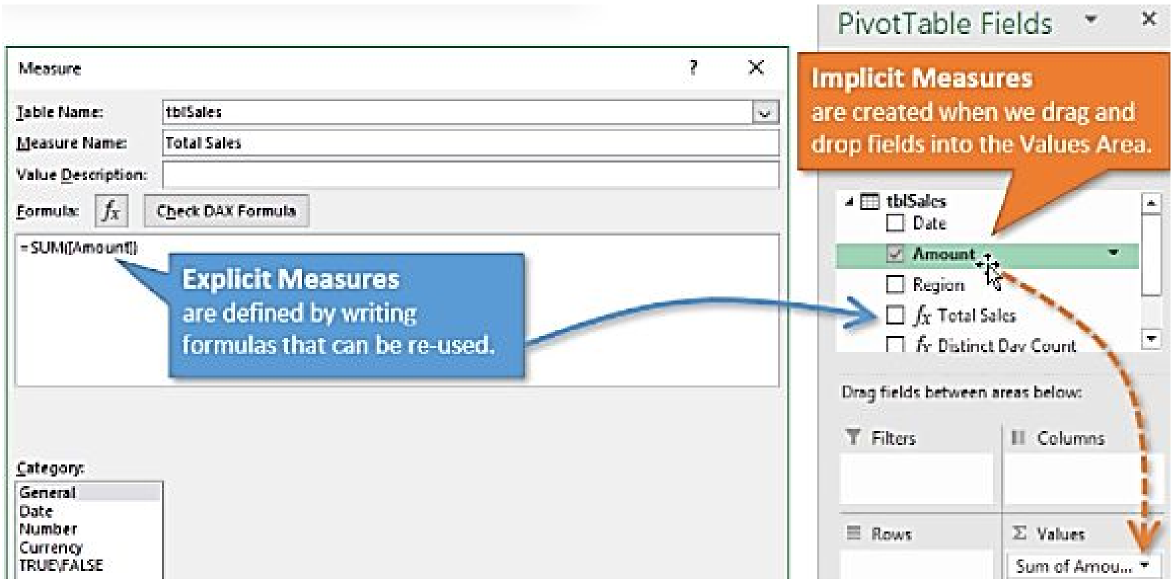
1. To construct the measures, on the table name in the pivot table list, right-click and pick Add Measure.
2. This will open the Measure Panel. In the box, type Total Sales while in the formula box put in =SUM([Amount]). Pick Ok.

The measure will be constructed and placed to the Fields List's base. For the other two measures, follow the same instructions above.

Measures: Implicit vs. Explicit

We could alternatively do the calculations for the first two formulae by moving the Amount and Date fields into the Values section, then adjusting the calculation type as needed. When we utilize Excel to generate a measure by using the drag & drop fields, we call them implicit measures.

Another method is to type the formulae in the Measure box as we performed before. We called them explicit measurements because we described or specified them explicitly in the formula operator.



The explicit measurements have the benefit of being reusable in other calculations or pivot tables. The Total Sales metric will be accessible in all new pivot tables created from the data model now that we've established it.

You can also utilize the Total Sales measure again, just as we did with the Daily Average measure, to create more sophisticated calculations. This saves time and improves the efficiency of formula writing in the long term.

3. The next step is to add the measures to the Pivot Table. You need not be required to populate the pivot table with all of the measure fields. Even though you merely add the Daily Average field to the Values box, the computations will still function.

The Total Sales and Distinct Day Count fields, on the other hand, might be useful additions to the pivot table. They may be useful in revealing further patterns or explaining why a daily average is high or low for a certain time.

4. To generate the trend report, we must now insert fields to the Rows and/or Columns Areas. In our sample, we'll group the Date field by Year, Quarter, and Month in the Rows section. The Subtotals in your pivot table are switched off if you're not seeing data for the Year, Quarter, or Month lines.

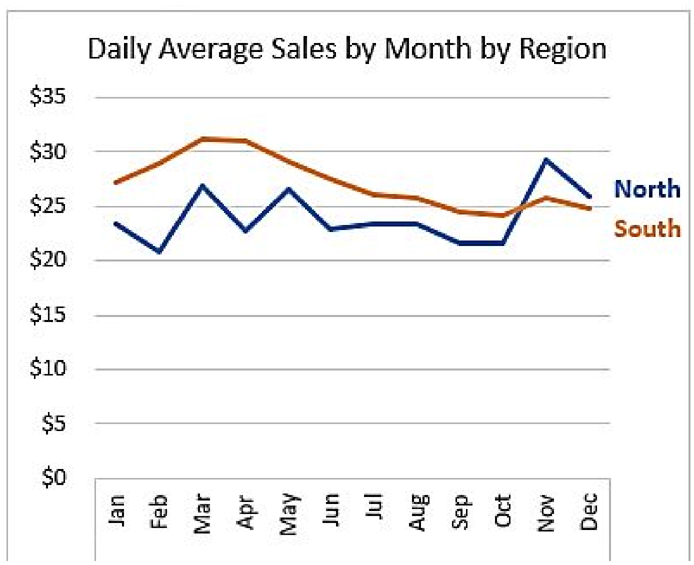
To enable Subtotals in a pivot table, follow these steps:

1. Within the pivot table, choose a cell.
2. Inside the ribbon, go to the Design tab.
3. Choose "Show all Subtotals at Bottom of Group" or "Show all Subtotals at Bottom of Group" from the Subtotals drop-down option.
4. The subtotal computations for the row area groups should now be visible (year, quarter, month).

7		
8	Row Labels	Daily Average
9	⊟2017	$50.78
10	⊟Qtr1	$52.97
11	⊟Jan	$50.57
12	1/2/2017	$53.94
13	1/3/2017	$44.88
14	1/4/2017	$54.20
15	1/5/2017	$26.02

Lastly, we will add a short pivot chart to examine the daily average patterns. A line chart comparing Average Daily Sales by Month and Region is shown below.

Daily Avg Sales	Colum abels	
Row Labels	North	South
⊟2017	$24.09	$27.18
Jan	$23.32	$27.25
Feb	$20.88	$28.91
Mar	$26.82	$31.21
Apr	$22.73	$31.00
May	$26.55	$29.10
Jun	$22.95	$27.52
Jul	$23.44	$26.09
Aug	$23.36	$25.76
Sep	$21.58	$24.43
Oct	$21.69	$24.22
Nov	$29.20	$25.72
Dec	$25.99	$24.81
Grand Total	$24.09	$27.18



In the latter two months of the year, the North area performed greater than the South. After March, the South saw a downward trend.

So, with Power Pivot and DAX Measures, you can generate daily averages using pivot tables. The potential of DAX measures is astounding, and this basic example merely scrapes the surface of what they can do.

Ranking Data

One of the most frequent methods for assessing data is to rate it. Comparing categories and items may be made easier by ranking them. The nice aspect about ranking is that you can see what's at the upper and lower part. You could save a huge amount of time and work by using ranking in a pivot table, and it will aid us in your evaluation. There are different ways to rank data in Excel. I will show you the methods. So, follow the steps below to do so;

1. In the pivot table that you intend to measure the ranking, add the value field two times.
2. Right-click on any of the cells in the second data column to choose them.
3. Select "Show Values As" from the drop-down menu.
4. You have two choices for adding ranking: "Rank Smallest to Largest" or "Rank Largest to Smallest." Choose whichever one you like.
5. The column values will be converted to rankings, and then you may sort the data to see how it ranks.

Note that the rank will be modified when you filter the pivot table.

In Source Data, Using RANK.EQ and RANK.AVG

This approach is a little more difficult, but it works perfectly. The advantage of utilizing RANK.EQ and RANK.AVG is that you don't have to modify your pivot table in any way. Simply take these few instructions below.

1. **Add this formula: =IF(COUNTIF(C$2:C2,C2)>1,"",SUMIFS($E$2:$E$1507,$C$2:$C$1507,C2))** in the formula bar after inserting your raw data. For each category in the column, the formula will add a single total. You may then use that sum to determine where each category ranks.

2. Below your data, include two extra columns. Then, enter this formulas **=IF(H2=””,0,RANK.EQ(H2,$H$2:$H$1507,1)) =IF(H=””,0,RANK.AVG(H2,$H$2:$H$1507,1))**. The rating for the category in your data dump will be calculated using AVG. Both of these routines were used to generate various ranking kinds.
3. Then, using this data dump, generate a pivot table similar to the one below. To determine the ranking, you can use either of the columns.

Month	Quantity	RANK.EQ	RANK .AVG
Jun	71	1	1
Jul	77	2	2.5
Mar	77	2	2.5
Sep	82	4	4
Feb	88	5	5
Aug	93	6	6
May	99	7	7
Jan	110	8	8
Nov	121	9	9
Dec	148	10	10
Apr	192	11	11
Oct	348	12	12

With this method, the filter you use on the data will not affect the ranking.

In a Pivot Table, create a separate Rank Column.

You may create a manual distinct column for ranking rather than using formulae or any other way. This function may be used to add ranks to a specific instance. Simply take these few instructions below;

1. Select a pivot table and organize the data as desired, ascending or descending.

2. Add the formulae below to the next two columns beyond the pivot table.

   =RANK.EQ(E4,$E$4:$E$15,1)

   =RANK.AVG(E4,$E$4:$E$15,1)

3. Drag them. You will see the ranking along with the pivot table.

Conclusion

I have explained how to rank your data or records using rank EQ and rank AVGand how to display averages in your pivot table. The steps I have explained in the implicit and explicit measures are very important. Ensure that you utilize them well.

CHAPTER FIVE

SLICERS (INTERACTIVE ANALYSIS) AND ADVANCED FILTERING

Slicers are a graphical filtering feature in Excel that allows you to view what elements are filtered inside a Pivot Table. Visualizations and summary reports are the most typical uses for Pivot Table Slicer. Slicers have the benefit of being able to link to many pivot tables and pivot charts, as opposed to pivot table filters. The slicer tool may be used on a data table, pivot table, and charts starting with Excel 2013.

Timeline Slicer

Slicers are similar to timelines. They let you analyze your data with the help of a visual interface, but they're only good for date fields. They make it simple to filter date categories by weeks, quarters, days, or years.

As you move from two directions on the timeline, the dates show in a horizontal line, progressing from oldest to newest. In PivotTable, timelines may only be used with date columns.

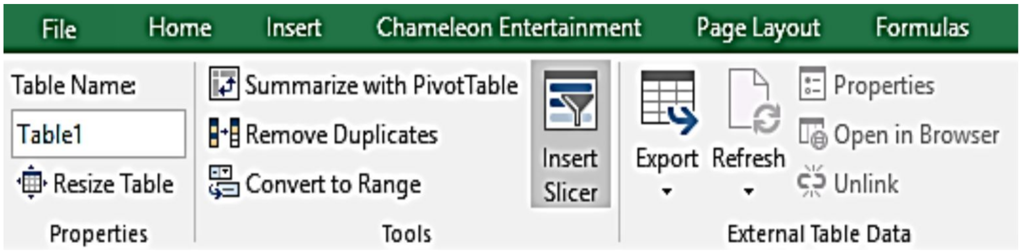
Adding a Timeline to a pivot table

Pick the Pivot Table for the timeline. Navigate to the Pivot Table Analyze tab and then select Insert Timeline.

Slicer

To add a slicer to a table, your data must be organized in an Excel table. Select a cell within your data and navigate to the Insert menu and choose Table to build an Excel table.

When your data is now in a table, a tab will be shown. On the Table Design tab, select **Insert Slicer**.



It will bring up the Insert Slicer box, where you can choose whatever fields in your data you wish to add a slicer too.

To generate many slicer objects at once, pick one or much more fields out from the list. You'll be capable of utilizing them both at the same time to sort data depending on different fields.

If you press OK, Excel will automatically construct the slicer objects.

Adding a Slicer to a Pivot Table

1. Simply, choose the pivot table for the slicer. Navigate to the **Pivot Table Analyze** tab and select Insert Slicers.
2. Then, choose the fields to add. Click Ok.

Advanced Filtering

There are lots of advanced filtering that you can do to/with the pivot table. So, I will be giving you some of the advanced filterings below;

Create a calculated field

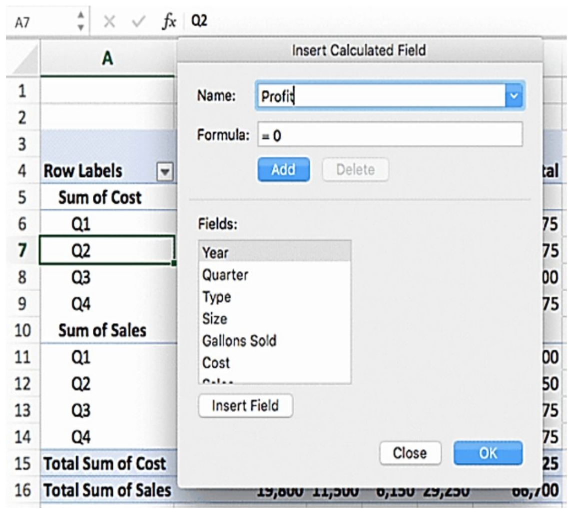
You're probably aware that Excel is a calculating engine, as well as the ability to construct a calculated field, is a feature you'll want in your toolbox when dealing with pivot tables.

A calculated field lets you maintain a computation operating across a pivot table, just as you would with a formula in a worksheet.

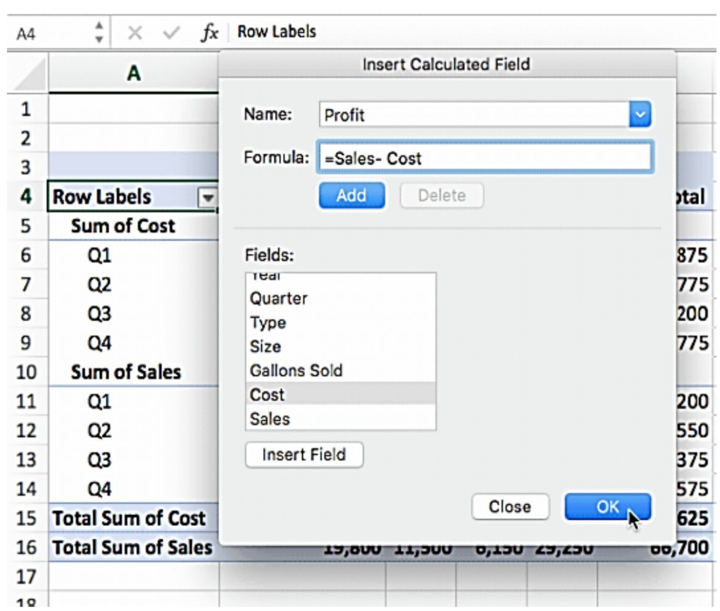
Ryan desires to know how much money he makes on each style of beer he sells: Pilsners, Stouts, Ambers, and IPAs. It's a pain to make the income computation outside the pivot table since he has to remove the Q1 expense from the Q1 revenues and do the exact thing for Q2, and so forth.

He can create a calculated field that will calculate the figures for him and tell him how much money he'll make on each sort of beer. And here is how you do it:

1. While within a pivot table cell, move to the "Pivot Table Analyze" tab, choose the "Fields, Items, and Sets" button, and then pick "Calculated Field."
2. Then, Ryan has to enter the name of the field.



3. Ryan must now input the formula he is attempting to compute. To calculate profit, he understands he must deduct his costs from his sales.



4. So, he'd go to "sales" and press "Insert Field," enter in the negative sign, and then go to "Cost" and press "Insert Field."
5. Ryan can readily view his income for each kind of beer—as well as his overall profit—on the lower part row of his pivot table now that the computed field is in position.

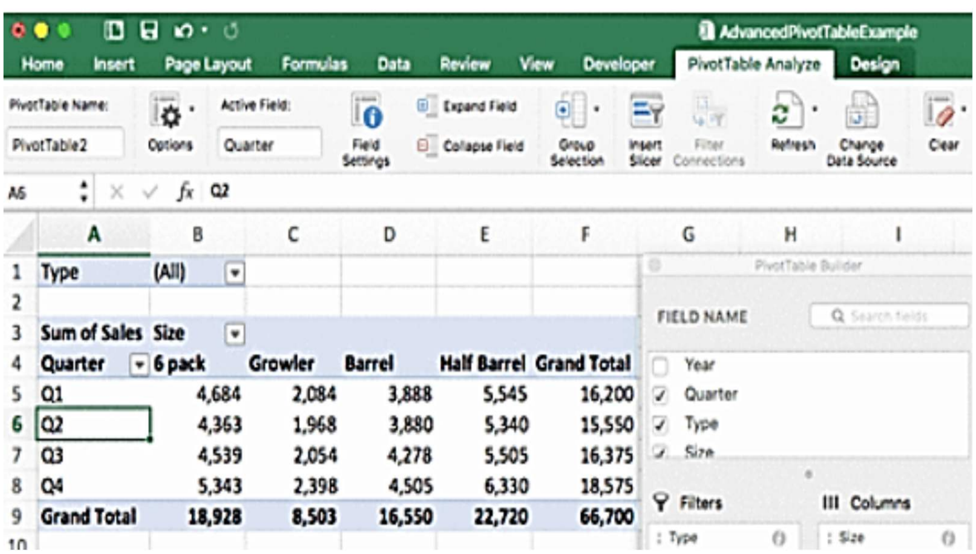
Using one Pivot Table to generate many pivot-tables

Understanding how to divide a pivot table into several tables comes in handy whenever you need to disintegrate your information even more.

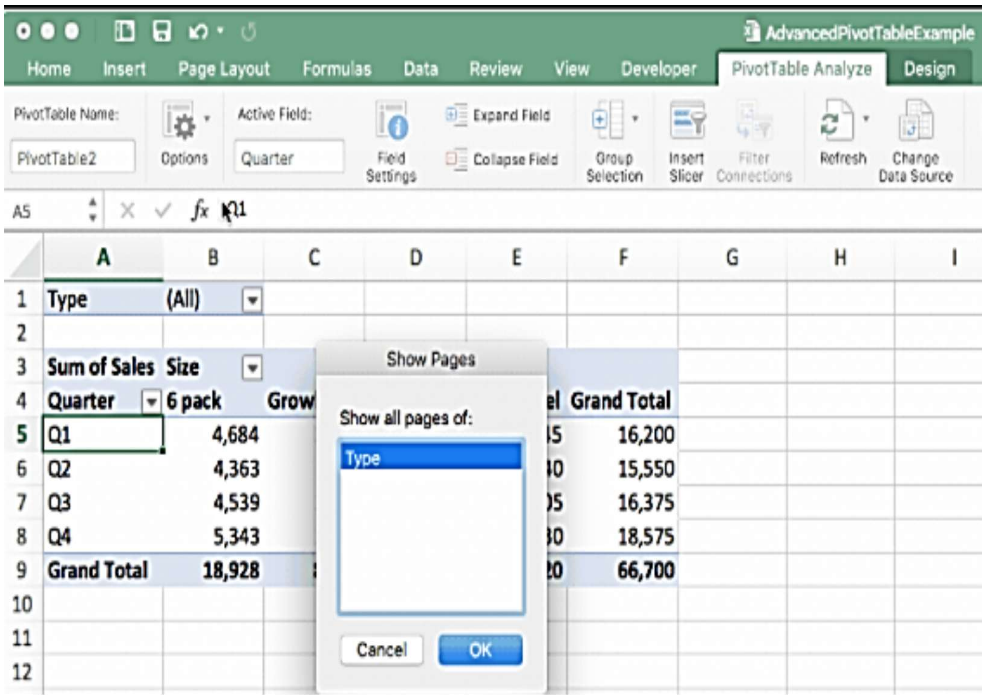
Here is another illustration: Ryan has a pivot table that shows his quarterly beer sales. He wishes to go a little further and look at his beer sales by quarter and by kind of beer (Amber, Pilsner, IPA, or Stout).

He'll achieve this by making a pivot table for each variety of beer: one for Amber, another for Pilsner, and so forth. Luckily, utilizing his initial pivot table as a starting point, he can do so in only a few clicks. So, this is how he'll go about doing it:

1. You'll have to add a filter to anything you want to sort your pivot tables with (in Ryan's case, the kind of beer). Select inside the pivot table, then go to the "Pivot Table Analyze" tab, choose "Field List," then move "Type" to the filtering list.



2. Ryan will select within the pivot table with that filter set, then return to the "Pivot Table Analyze" tab and click "Options," and afterward pick "Show Report Filter Pages." When Ryan selects "Variety" as the criterion for breaking down the data, Excel creates a whole new spreadsheet with a pivot table for every brand of beer.



Hiding and unhiding subtotals

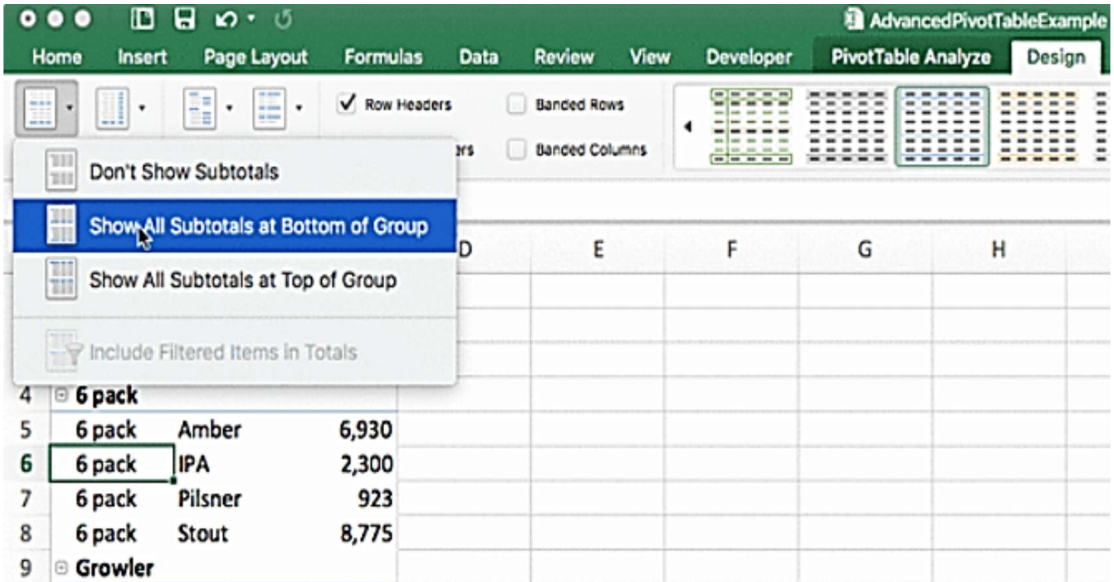
We've previously discussed how Excel can save you a lot of time when it comes to mathematical calculations. However, this isn't limited to the whole quantity of digits. If you want, you may also show subtotals in your pivot table.

Let's pretend Ryan is going through his beer sales statistics by size and kind. Excel doesn't show the subtotals for each area since his settings are set to show just the cumulative sum of all beer sales.

Ryan would want to examine the data in greater detail as well, and it's simple for him to just do so:

1. First, select the Pivot Table and pick the Design tab.

2. Click on Subtotals. Choose where you want to display the subtotals. It can be at the bottom or at the top.



3. If you don’t want to show the subtotals, select them from the options there.

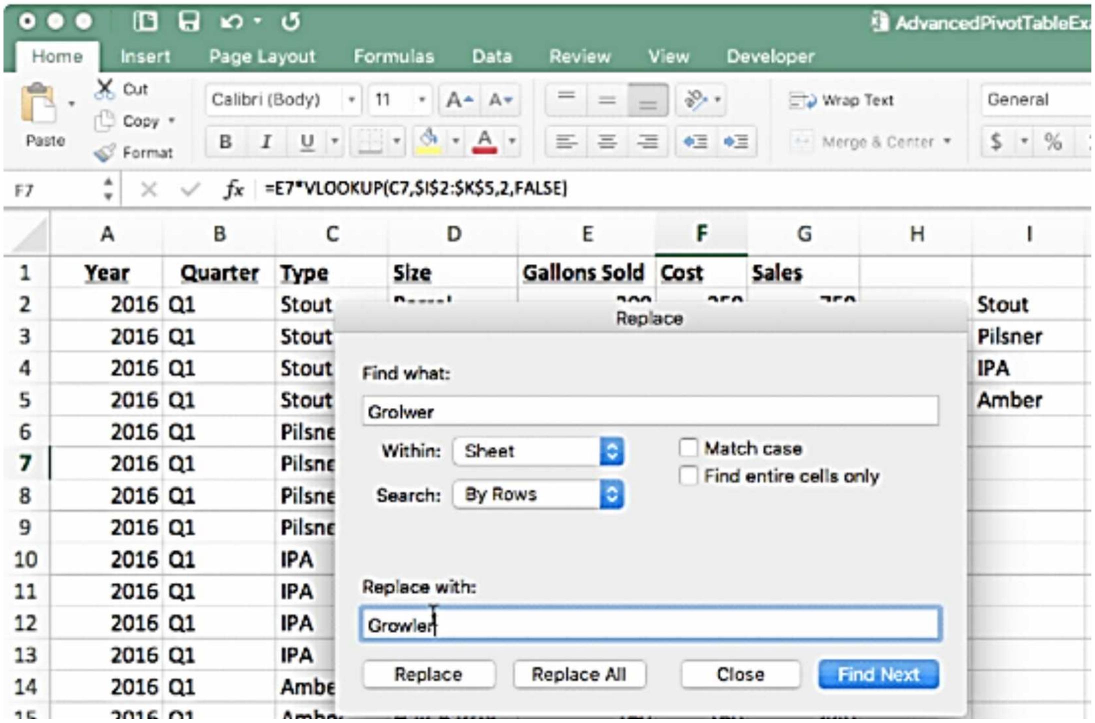
Refresh your Data

Here's just a nightmare situation suitable for a horror movie score: You've been working with your data for hours, and you've created a plethora of pivot tables from your source data, just like Ryan.

You re-examine several of your pivot tables and discover that you messed up; maybe the data set contains an error. For instance, Ryan misspelled "growler" as "grolwer," and it now looks that way throughout.

Is he going to go through his worksheet with a fine-toothed comb to make sure the issue is corrected in all of his data and pivot tables? Certainly not. All he has to accomplish now is:

1. Perform a "search and replace" on the raw set of data from which the pivot tables are derived. He'd press Control key + F, then type in what he wanted to detect and what he wanted to replace it with.



2. This will replace the errors in that spelling. Click on the Data tab and choose Refresh All to get an update on everything.

Conclusion

A slicer is an important tool in Excel. It helps in adjusting your data. There are lots of advanced filtering that you can perform on your table. The ones I have given here as an example will serve as a guide on how to go about with others.

CHAPTER SIX

INTRODUCTION TO DASHBOARDS

A dashboard is an arrangement of information in a visual format. It's a procedure whereby you put forth all of your attempts to make your difficult data seem more understandable and manageable via the use of visual tools. There are a variety of Excel tools that may be utilized to build a dashboard. Here are a few examples:

Histograms, Bar Charts, Pie Charts, Line Charts, Combo Charts, Pivot Tables, Slicers, KPIs, and so forth. These are the technologies that may be used to construct a dashboard and make data that seems to be difficult easier to grasp.

To make an Excel dashboard, we must first construct a pivot table with the data. There must be a separate pivot table for each graphic. After that, drag and drop the pivot table into position, and create as many sheets as needed.

After we've built and labeled each Chart, we can use the Chart area of the Insert menu item to create various graphics using different chart kinds. Take all of the charts from their individual sheets and set them on the sheet for the final dashboard after they've been produced. We may also include the slicers in the final dashboard.

Adding Multiple Pivot Tables to a Worksheet

Sometimes when the data is spread across multiple workbooks or worksheets, you have two options for creating a pivot table: one of which is to copy and paste all of the data into a single sheet and then create a pivot table from it; the second is by using the MS Excel wizard to create a pivot table from multiple sheets.

Let's say we get data from a store that sells computer components like keyboards, mouse, hard drives, monitors, and so on. They have always had this data on an annual basis; as seen in the figure below, we've taken three years' worth of data and reduced it to only three columns, one of which is used to designate the specific sheet.

Table1

	A	B	C
1	Year	Category	Sales Counter
2	2015	Key Board	5500
3	2015	Mouse	7080
4	2015	Monitor	3500
5	2015	Hard Disk	4200
6	2015	Speaker	7500
7	2015	Cables	8100
8	2015	Pendrives	9000

Table2

	A	B	C
1	Year	Category	Sales Counter
2	2016	Key Board	4200
3	2016	Mouse	5500
4	2016	Monitor	3600
5	2016	Hard Disk	5060
6	2016	Speaker	7800
7	2016	Cables	6800
8	2016	Pendrives	8300

Table3

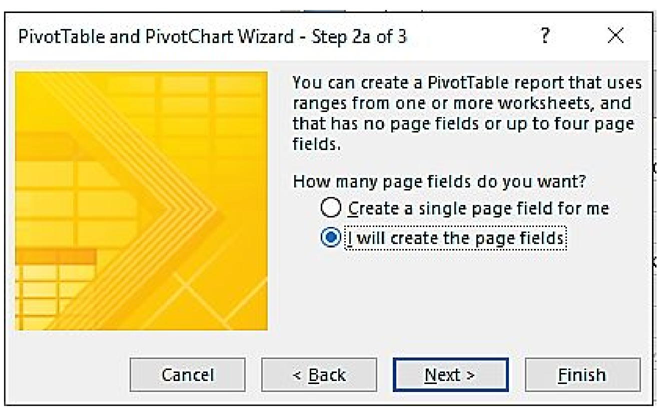
	A	B	C
1	Year	Category	Sales Counter
2	2017	Key Board	6200
3	2017	Mouse	7900
4	2017	Monitor	5600
5	2017	Hard Disk	6300
6	2017	Speaker	7020
7	2017	Cables	6060
8	2017	Pendrives	8760

The following data is spread over multiple sheets in a single workbook; we've labeled each sheet with the sales year. We have data for the years 2015, 2016, and 2017, and we're double-checking that the columns, categories, and sales counters are all the same. The data in this table displays the products sold by this store in each of the years.

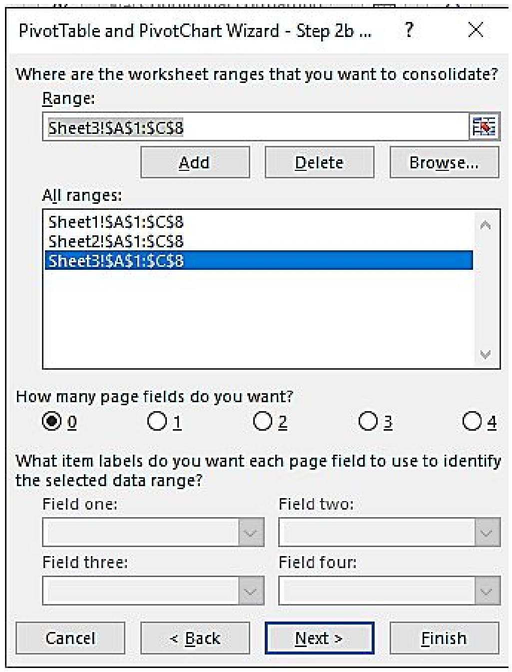
We have to enter the Pivot table and Pivot Chart Wizard to generate the main pivot table from these separate worksheets; this feature was blocked in older MS Office versions, but it can be accessed using the shortcut keys Alt key + D + P. Alt key + D is the office access key for Microsoft Excel. When you press P after that, it will navigate you to the wizard.

The wizard will display two questions for you which are; Where is the data you want to analyze and What kind of report do you want to create. Pick Multiple consolidation ranges from the "Where is the data you want to analyze option". Then, pick the Pivot table on the "**What kind of report do you want to create option**". Click Next.

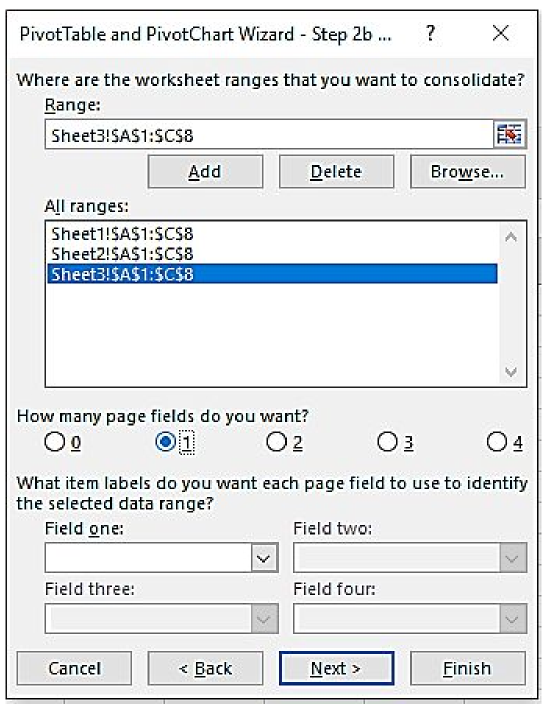
The next box will ask you "**How many page fields do you want**". Pick "I will create the page fields option". Choose Next.



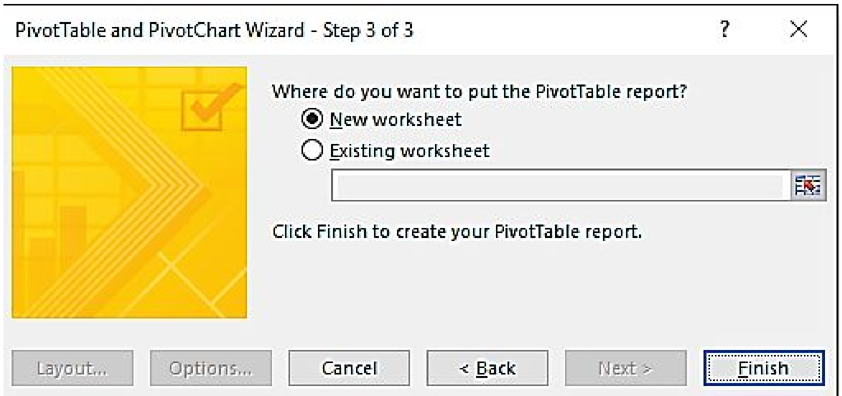
The next box will ask "Where are the worksheet ranges that you want to consolidate". Simply select the ranges of the cells in each of the sheets and select Add.



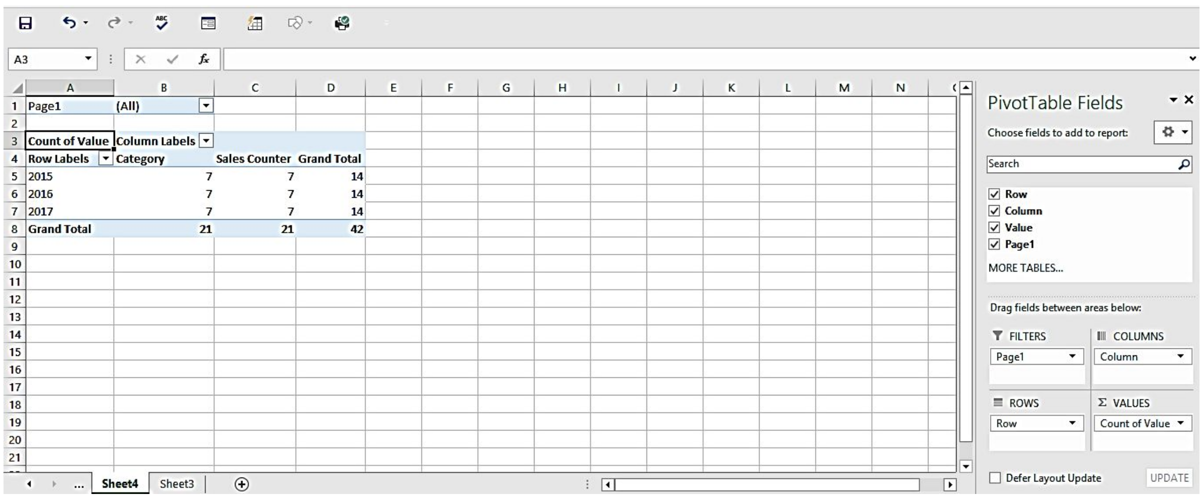
On the option on “How many fields do you want”, select One. However, it is set as 0 by default but here we want our table to have a difference of one year in it. When you do so, click Next.



Then, select where you want to put the Pivot table report. Click on New Worksheet and pick Finish.



The Pivot Table will display in Sheet 4 of your workbook.



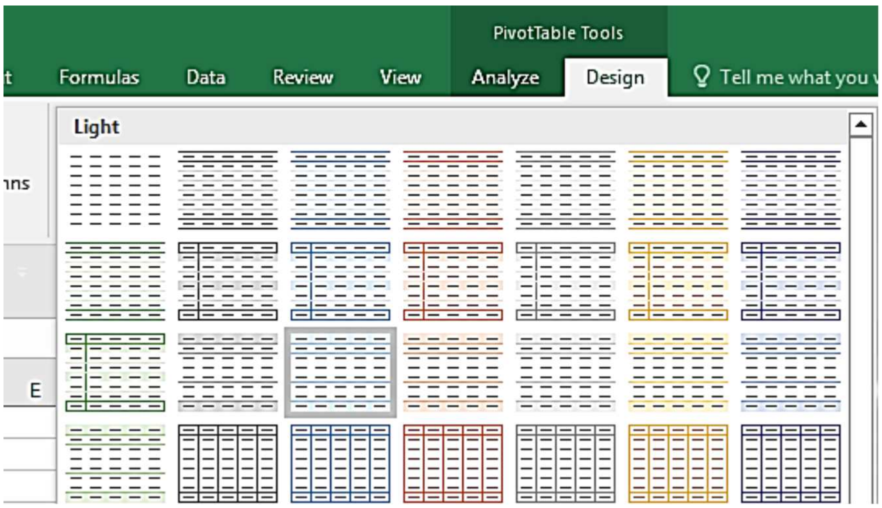
You should note that the sheets you wish to be included in the pivot table must all have the same column when generating the pivot table from several sheets.

You can also give the table a name (just as we did with the matrices) so that anytime you alter the values in the sheet, the data in the pivot table will update as well.

Formatting the Dashboard.

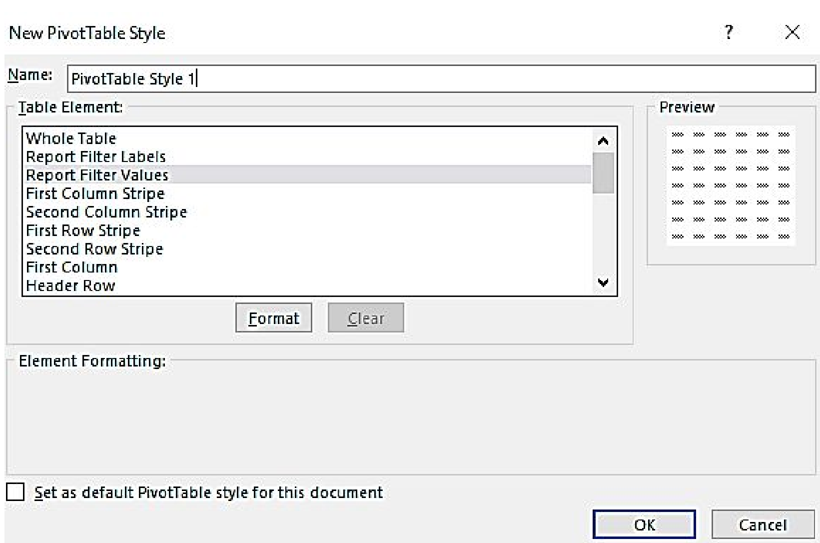
You can choose whether to improve the report structure and format after establishing a Pivot Table and inserting the fields you want to examine. This will make the data simpler to read and search for details. You may modify the PivotTable form, as well as the way fields, columns, rows, subtotals, empty cells, and lines, are shown to change the design of a PivotTable. You may use a predetermined style, banded rows, and conditional formatting to customize the PivotTable's format. so, let’s look at some of the formatting options for the Pivot Table.

Default style: You can change the default structure of your pivot table. On the Design tab, you will see the different styles. You can pick a color from the list of different colors displayed for you.

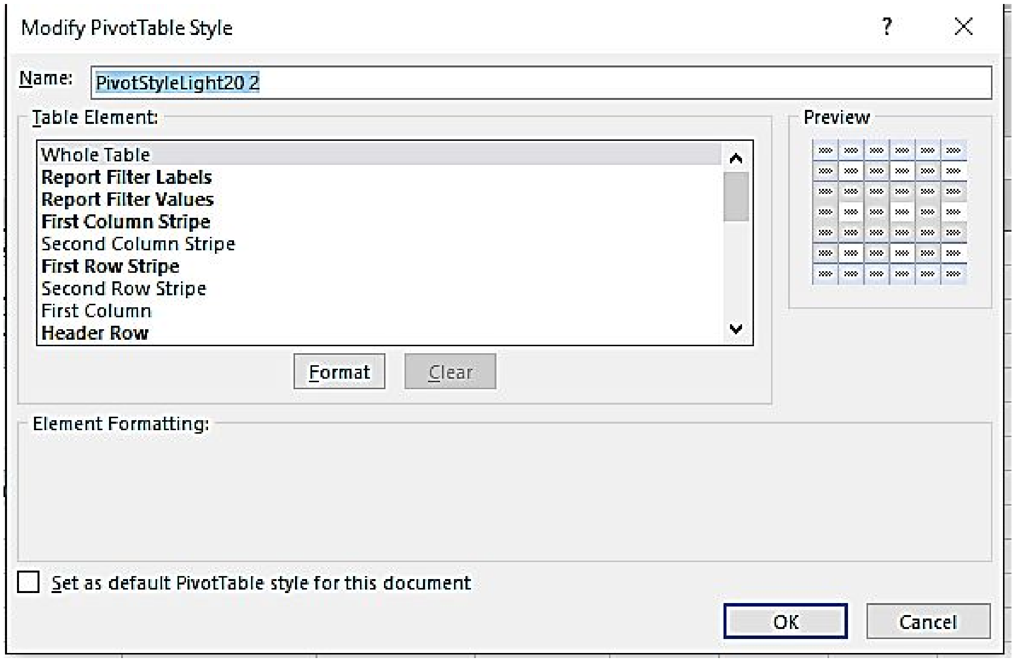


Simply right-click on the style you want. then, choose “Set as default”. the style you have selected will become your default style for the pivot tables.

Creating New Style: On the Design Tab, click the down arrow on the Pivot Styles menu. Click on the New PivotTable Style. On the New Pivot Table Style box, enter the name for the style. Pick an element for formatting and click Format. Click Ok.



Duplicate and Multiply: Right-click on the style you want to duplicate. Choose Duplicate from the list of options displayed for you. This will open up the Modify PivotTable Styles box.



Copy Layout to a Different Worksheet: First open the workbook that has the custom layout. Then, open the new workbook where the layout will be copied to. Put the two workbooks close to each other. To do this, use the Arrange all options in the View tab.

Then, hold the Control key and drag the layout sheet to the new workbook.

Adding Charts to the Dashboard

- To add a chart, go to Menu > Add New Widget...
- Pivots and Charts may be accessed by clicking on them.
- Select a chart type from the drop-down menu.
- Choose one of the following options for the data source:
    a. Select a data source after clicking the Search button
    b. Select another widget on the same dashboard from the Link to the drop-down list.

- Specify the settings for the chart
- Select Ok.

Parameters for Charts

When the data source utilizes members as rows and measurements as columns, a chart is typically more informative.

Notes:

If you utilize a pivot table with a summary row or column, the row or column will be disregarded.

Almost all of the chart types may also be seen in the Analyzer before being added to a dashboard.

Only the top 400 chart elements are shown, with the exception of line and time charts.

Conclusion

The dashboard helps to make your data understandable and neat. Here, I have given different ways of how to format your dashboard to enhance its performance. Use them very well on your pivot table.

CHAPTER SEVEN

ADDING SLICERS AND PERFORMANCE SYMBOLS TO YOUR DASHBOARD

Slicers

Many capabilities were integrated into Microsoft's slicers that enable users to personalize them. You may change the caption that appears above the slicers. The numbers of columns in which the slicers are shown may be customized. You may conceal or make some contrast adjustment to the text, fill, and outline of 16 slicer components by going to the Slicer Styles gallery and creating a new Slicer Style.

Having so much flexibility available, using a slicer on a dashboard as a quick method to choose one or more things from a list is logical. Make a brief list of objects that should be in the slicer as a resolution. Create a pivot table with those entries in the rows part of the pivot table in an out-of-the-way area of the worksheet. Make a slicer out of the pivot table and design it to look like your dashboard.

Figure 1 shows a list of months in cells X1 through X13. Choose the information you want. Insert a pivot table in cell Z1 using the pivot table's location specified. In the rows box, type "Months." Delete the Grand Total by right-clicking it and selecting Remove Grand Total.

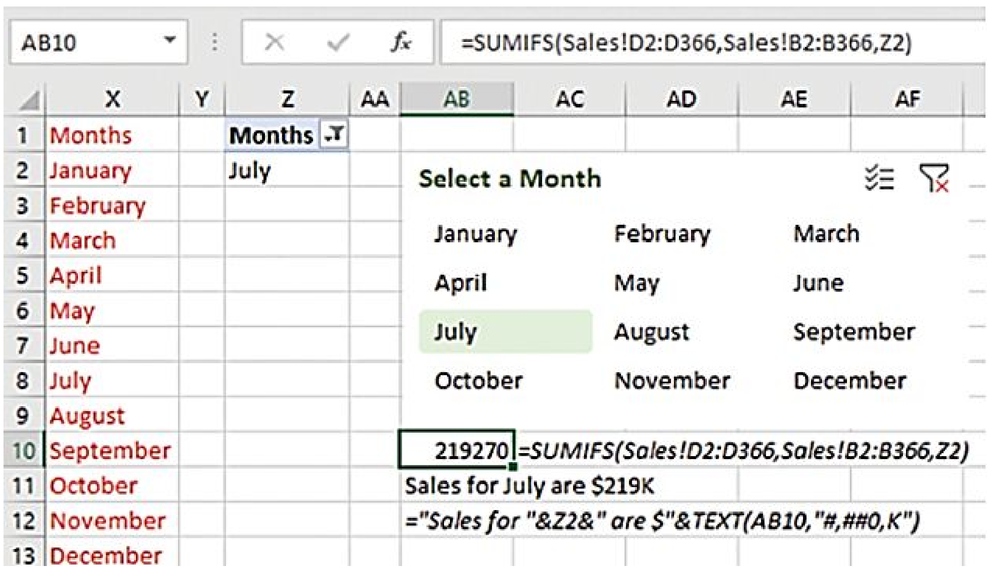
Select Insert Slicer, then Months from the PivotTable Analyze tab. Figure 1 shows the slicer in AB2:AF9.

The Slicer tab may be customized in a variety of ways:

1. "Select a Month" should be the caption.
2. Expand the number of columns to 3 or 6.
3. Select New Slicer Style from the Slicer Styles collection. To eliminate the Whole Slicer's edge, format the different parts of the slicer.

You can be confident that when customers click on a month in the slicer, the chosen month will display as the second cell in the pivot table. You can see in Figure 1 that Z2 includes the specified month.

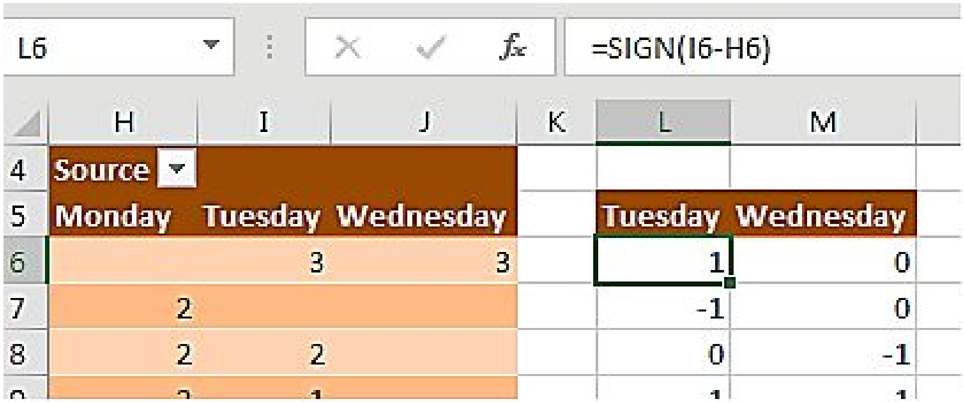
You may use FILTER, INDIRECT, SUMIFS, COUNTIFS, VLOOKUP, XLOOKUP, or other functions with the specified month in Z2 to get information about the selected month. A SUMIFS in AB10 obtains the total sales for July, and the formula in AB11 presents the result with the month name and total sales amount, as shown in Figure 1.



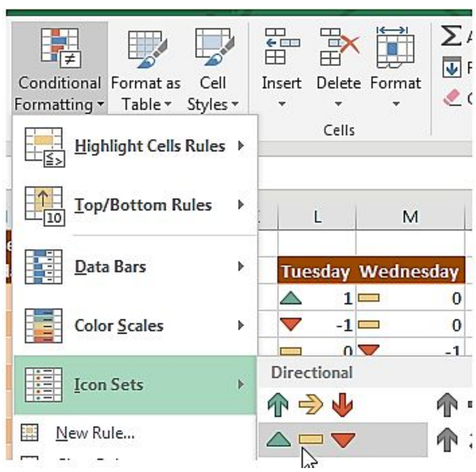
Performance Symbols (up/down arrows and other indicators)

There is a super-obvious method to put up or down markers to a pivot table to show an increment or reduction.

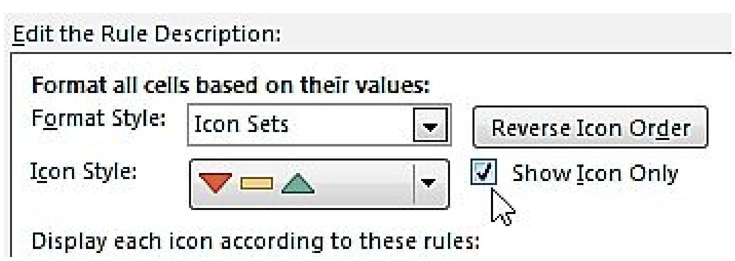
Insert columns to illustrate increments or reductions beyond the pivot table. The disparity between I6 and H6 in the picture below is 3, but you only like to indicate it as a successful development. SIGN(I6-H6) returns one of three values: +1, 0, or -1.



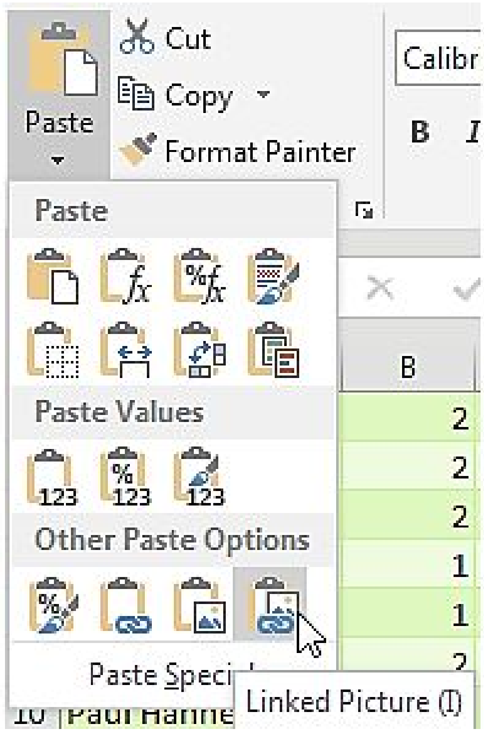
Choose Home, Conditional Formatting, Icon Sets, 3 Triangles from the two-column range that shows the indication of the change. (I'm not sure why Microsoft named this selection Three Triangles when it's obviously Two Triangles and a Line.)



Choose Home, Conditional Formatting, Manage Rules, Edit Rule with the same range selected. Select the Show Icon Only option.



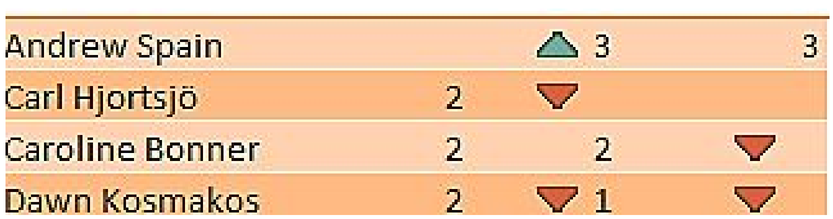
To copy, hit Control key +C while keeping the same range chosen. In the pivot table, choose the first Tuesday cell. Click the Paste Dropdown from the Home menu and select Linked Picture. Over the table, Excel displays a live image of the icons.



Modify the column dimensions of the additional two columns displaying the icons at this stage so that the icons align with the values in the pivot table.

Name	Monday	Tuesday	Wednesday
Andrew Spain		3	3
Carl Hjortsjö	2		
Caroline Bonner	2	2	
Dawn Kosmakos	2	1	
Jean-Yves Hemlin			1

Having viewed this, I'm not a fan of the broad yellow dash used to denote "no change." Select Home, Conditional Formatting, Manage Rules, edit if you don't like it. Pick No Cell Icon from the selection for the bright yellow line.



Andrew Spain		3	3
Carl Hjortsjö	2		
Caroline Bonner	2	2	
Dawn Kosmakos	2	1	

Conclusion

You work well on your pivot table when you add slicers and the performance symbols to it. Use the examples given here to add slicers to your pivot table.

CHAPTER EIGHT

REFRESHING PIVOT TABLE AND DASHBOARD DATA

When data in the PivotTable source list is modified, the PivotTable does not immediately recalculate. Below are some reasons why you might need to refresh an Excel Pivot Table

- When the data structure changes, the pivot table must be refreshed.
- At a later time, a source data variable is changed or modified.
- More rows are included in the basic pivot table data set.
- Existing rows in the source data used as a source for the Pivot Table are removed, or
- The fresh data entering from the sources (SAP, ERP, upstream data sources) varies as the day, week, month, or quarter changes.

So, if you create a pivot table to evaluate data and afterward the data changes after several days or weeks, you need not recreate the Pivot Table. You just need to refresh it. There are different ways you can refresh a pivot table.

1. Existing Data, the values vary considerably, while the numbers of rows of data remain constant:

The data is changed first in this approach.

- Navigate to the Pivot Table. Right-click within the Pivot and select Refresh.
- The Pivot Table is instantly updated. Use this simple method whenever the source data alters.
- In the Excel Ribbon, you may also pick the Refresh All button.

2. The size of the data in Excel changes

New rows or columns are added to the data collection, but this new data is not represented in the pivot table. In this scenario, we must change the pivot table's data range source to include the most recent data rows and columns. There are a few options for doing this.

A. When your pivot table is reliant on data in a variety of cells, such as cells B1:H50, you must increase that range to cover more rows and columns.

The simplest method is to go to the Pivot Table Analyze Tab and select the Change Data Source choice button. The current data range from the source will be indicated (highlighted). Re-select the new data range and choose the OK button.

After it is done, click the Refresh All option to refresh the data from the newly chosen rows/columns and update the pivot. The pivot table will quickly be refreshed.

B. The process is considerably simpler if your pivot table is based on a Table, such as Pricing Table, Table1, and has been turned into a Table.

C. All you have to do is click the Refresh button under the Analyze Tab, and the pivot table will be instantly refreshed.

To use a Table as a data source for a Pivot Table is a smart technique that you should use more often. When generating a new pivot table, it utilizes the whole Excel table, and any additional rows added or deleted afterward are automatically regarded as part of the Pivot Table.

3. Refresh automatically when the Pivot Table is opened.

You may also choose to have your PivotTables update every time you open the worksheet. On the Options tab, click the Options button, and then on the Data tab, check the box next to Refresh data upon opening the file.

Conclusion

Here, we have discussed how to refresh your Pivot Table. As stated above, it is an easy process and it can be done in different ways. Simply use any of the options that are most suitable to you.

CHAPTER NINE

PROTECTING YOUR DASHBOARD

You may wish to enable users to make modifications to a pivot table in certain workbooks, but you must secure formulae or data in other portions of the worksheet.

Users will be able to alter the pivot table if you protect the worksheet and allow pivot table usage, but they will not have access to the other restricted elements of the worksheet.

Hiding your Pivot Table Source Data

Go to the table you wish to hide in Excel, then click "Add to Data Model" from the Power Pivot menu. In Power Pivot, you can now "Hide from Client Tools" to make the table immediately visible.

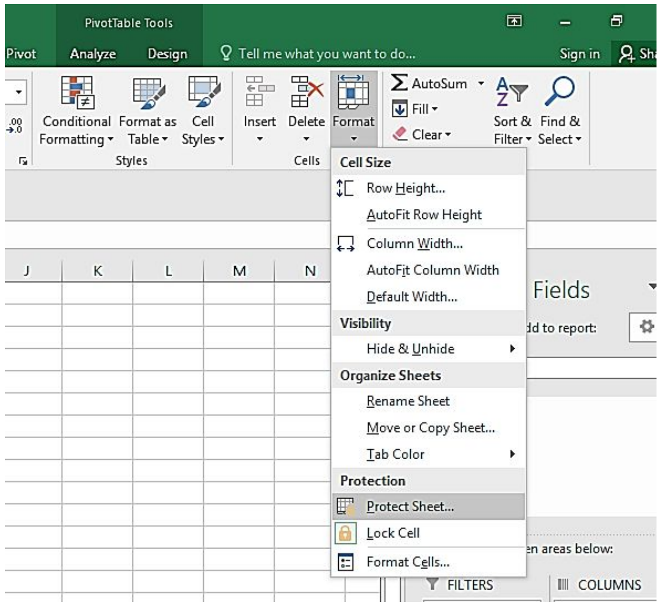
I agree that tables outside of your data model should not be shown in the PivotTable Fields view, but with this approach, you can at least hide them, and as long as you don't build any relationships, you should be OK in terms of speed.

Protecting the Dashboard or any other Worksheet

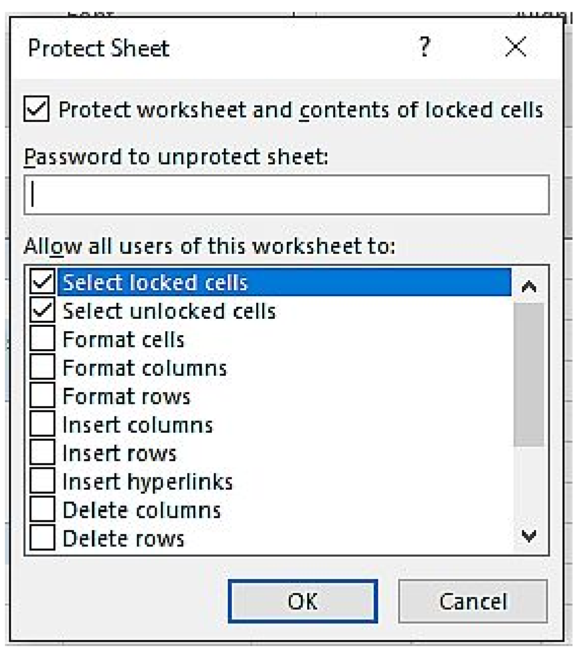
You may want to be the only one that has access to your worksheet or dashboard of your Pivot Table. This can be achieved by protecting the sheet. To do this, simply follow the steps below;

Click on the Home Tab and select Format.

From the drop-down window, select Protect Sheet.



Now, enter the password for the worksheet. Also, you can select what you want users to do with the sheet.



Conclusion

Protecting your pivot table is very important. It is advisable to do so. It saves you from people making some adjustments to your work when you are not around.

CHAPTER TEN

GROUPING PIVOT TABLE DATA

Large volumes of data may be readily summarized, analyzed, and presented using pivot tables. To do so effectively, you must first be able to arrange the data into suitably sized and ordered subgroups. You can easily achieve this using Pivot Tables' grouping and ungrouping functionalities.

Understanding how to arrange data quickly in a PivotTable report may be really beneficial. This is due to the fact that it makes it simple to organize a large quantity of diverse data into a few categories or subcategories. Fewer groups enable you to streamline your assessment and concentrate on the most important (grouped) things.

Grouping Records

1. Right-click a value in the PivotTable and choose Group.
2. Choose the Starting at and ending at checkboxes in the Grouping box, then modify the values as necessary.
3. Select a period of time under By. Add a number that determines the intervals for each group in mathematical fields.
4. Choose OK.

Group the selected data.

1. Select two or more values while holding the Control Key
2. Select Group from the context menu by right-clicking.

Name a group.

1. Choose a group.
2. Select Analyze. Then, pick Field Settings from the drop-down menu.
3. Select OK after changing the Custom Name to whatever you like.

Ungroup data that have already been grouped.

1. Any item in the group may be selected by right-clicking it.
2. Choose Ungroup.

Errors Troubleshooting (Grouping)

Whenever you attempt to group a selection, you may get an error message stating that you are unable to do so. This could happen for a variety of reasons. Being that you must pick two additional entries to establish a group if you want to group data within your own custom groups; you cannot construct a group with just one item.

You will have an error notice if there are empty cells in a field, such as a date or a number field. If you have a text input in a date or number field, you will get an error. Examine the actual data and rectify the issue in each instance, then reload the PivotTable prior to actually attempting again.

Multiple Consolidation Ranges and Grouping

You may also make groups in a PivotTable using data from several consolidation ranges, such as data from multiple sheets in a workbook. To do so, go to the Quick Access Toolbar dropdown menu, pick More Commands, then scroll down to find the PivotTable and PivotChart Wizard in the All-Commands group. To put it to the Quick Access Toolbar, click Add.

You may now make a PivotTable out of a collection of sheets that are all put up in the same way. Whereas each sheet may have varying amounts of rows of data, you'll require data with the same number of column titles.

Count Function

Even if the other numbers are presented using another function, such as COUNT, a computed field always utilizes the SUM of those values. You'll see an illustration of this issue in this example, where:

1. The COUNT function is used in the date field.

2. In the computed field of a pivot table, dates are summed rather than counted.

These are the stages that indicate the computed field issue in the specific procedures below:

1. Construct a pivot table.
2. Change the Date field to Count.
3. Create a field that is calculated
4. The date count is discarded in favor of SUM.

The procedures for resolving the computed field issue are as follows:

1. In the source data, add a new field.
2. In the computed field of the pivot table, use the new field.

Count the field

1. First, we'll add the order Date field and use it to show a count of orders to demonstrate the issue with utilizing a field shown as COUNT.
2. Build a pivot table with the Orders data in the Row area, and Units and Total in the Values section, using the Rep and Product columns.
3. In the Values box, add the Date field, which should display as Count of Date.
4. This column displays the total number of orders for each item and sales rep.

3		Values		
4	Row Labels	Units	Total	Count of Date
5	⊟Andrews	592	5,474.19	12
6	Binder	158	788.42	3
7	Desk	11	3,025.00	3
8	Pen	56	111.44	1
9	Pen Set	226	1,127.74	3
10	Pencil	141	421.59	2

After that, we'll make a calculated field and see whether the date field is bigger than two.

- Pick a cell in the pivot table, then choose the Analyze tab, underneath the PivotTable Tools tab.
- Hit Fields, Items, & Sets in the Calculations group, then Calculated Field.
- The Insert Calculated Field window pops up, where you may input formulas for calculated fields.
- As the name, type CountA.
- Type =Date > 2 in the Formula box.

NOTE: If you choose, the spaces may be removed.

- Click Add to preserve the computed field, then Close.

Conclusion

When you group your data, it makes it easier for you to access them. When you have large files, grouping them is the best option for you. And I explained how to do that as well as how to handle the grouping error issues.

CHAPTER ELEVEN

CALCULATED FIELDS IN PIVOT TABLES

Calculated Fields are most often used to add a new Field to your Pivot Table. The newly introduced Field performs computations depending on the values of other fields, in most cases.

Calculated Fields, in more specific terms, employ the sum of the original data of the Field(s) that the Calculated Field calculation uses. Furthermore, when you interact with Calculated Fields, you're dealing with all of the relevant Field's underlying data (rather than individual Item(s). Calculated Fields are handy when you wish to utilize all of the data from a specific Field(s) in your computations for the reasons stated above.

Assuming you need to calculate the Cost of Goods Sold for every retailer and item using a simple technique. The computation is quite basic to make the instances as easy as possible and to concentrate on the concept of Calculated Fields. For each item and shop, we'll believe you can compute the Cost of Goods Sold as a percentage of the Sales Amount. Arithmetically:

COGS = Total Sales multiplied by a percentage

It's worth noting that the Pivot Table's source data lacks a column for Cost of Goods Sold.

In certain cases, you may be able to add such a column by going back to the source data. In other circumstances, however, making a new column to the data sources may not be feasible or practical. Using a Calculated Field instead of adding a new column to the source data is an option.

This isn't to say that Calculated Fields aren't useful in certain situations. I'll go through a few typical Calculated Fields issues and restrictions further down. That overview should aid you in identifying situations when Calculated Fields are not the best option.

Adding a basic calculated field

We'll be dealing with a Calculated Field titled "Cost of Goods Sold" in this example. This Calculated Field consists of:

1. Values from other fields are used (Total Sales).
2. Performs certain computations (multiply Total Sales by a percentage).

Calculated Fields are not to be confused with Calculated Items. These names pertain to separate constructions, despite the fact that they have certain characteristics.

Calculated Items vary from other types of items in that they function with individual data. Calculated Items, in other words, enable you to operate with Item(s) from inside a Field.

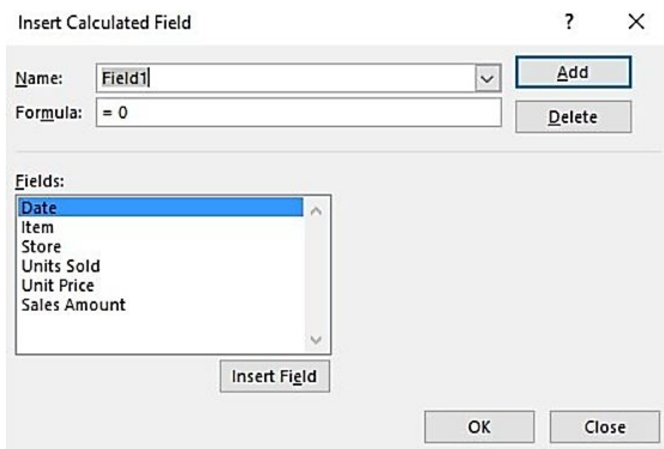
As previously stated, Calculated Fields employ all of the original data of the Field(s) that the Calculated Field formula uses.

To put it another way, you typically do the following:

1. When you wish to deal with all of a Field's underlying data, use Calculated Fields (s).
2. As previously said, adding a column to your source data is an approximate approximation of Calculated Fields.
3. If you want to interact with a particular Item(s) inside a Field, use Calculated Items.

Calculated Items are essentially comparable to increasing row(s) to your source data, just as Calculated Fields are approximately comparable to extra columns in the source data. Now that you know what a Calculated Field is, let us just look at how to create one:

1. Simply choose the Pivot Table.
2. Click on Analyze on the ribbon. Pick Fields, Items, and Sets. Then, choose the Calculated Field.
3. The Calculated Field box will display. Put in the name for the calculated field. Then, enter the formula as well.



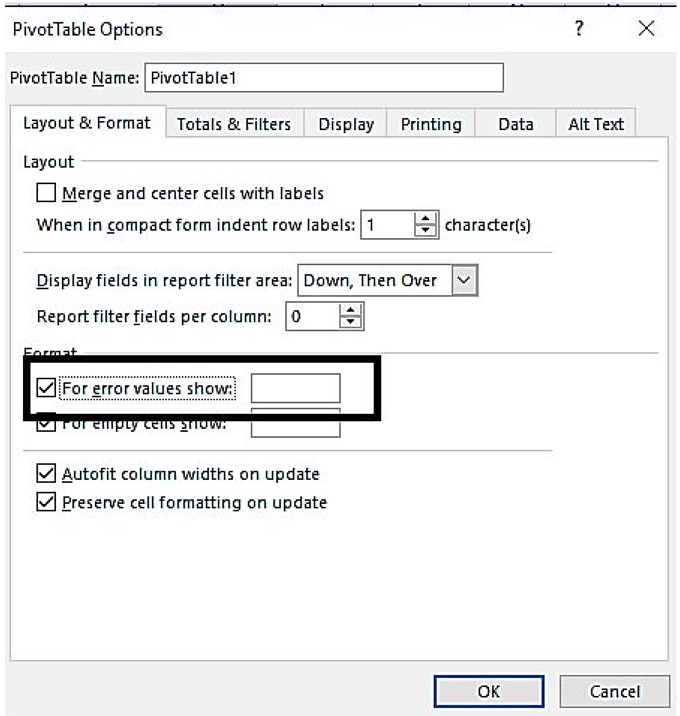
4. Click Add.

Changing the display of formula error messages

In most circumstances, I love seeing mistakes on the spreadsheet so that issues may be quickly identified. Nevertheless, instead of displaying the faults in the pivot table, you could wish to hide them.

Error data are shown as a pivot table by default. You may conceal the mistakes by modifying the PivotTable Options so that blank cells display instead of the errors:

- Select a cell in the pivot table by right-clicking it.
- Select PivotTable Options from the context menu.
- Click the Layout & Format tab in the PivotTable Options dialog box.
- Put a checkmark next to For Error Values in the Format section.



The errors will be substituted with blank cells if the text field is left blank. Note: You may write other characters in the text field to substitute the incorrect values with that character, such as a hyphen.

- To exit the dialog box, click OK.

Note that this option only has impacts on cells in the pivot table's Values section. Error-values will not be updated if they occur in the Row Labels, Column Labels, or Report Filter areas.

Removing or changing calculated fields

You might not want to show a Calculated Field in your Pivot Table report in certain circumstances. In such circumstances, you have two choices:

- Hide the Calculated Field.
- Delete the Calculated Field.

The major distinction in hiding and deleting a Calculated Field is that when you delete one, Excel permanently deletes it. If you just hide the Field, this isn't the case. Whenever the Calculated Field is hidden, it remains visible in the Pivot Table Fields task window.

Let's have a look at how you can put each of these ideas into action:

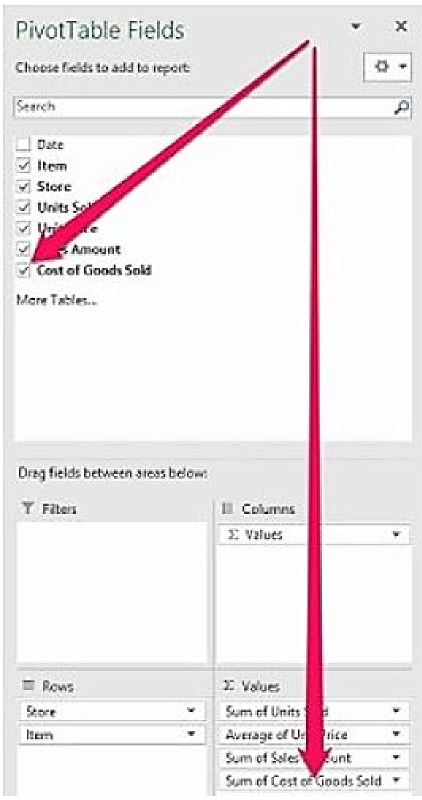
Excel adds a Calculated Field to the Field List when you add it to a Pivot Table. More specifically, the Calculated Field is most often seen in the following areas:

1. The list of Pivot Table Fields.
2. The Pivot Table's Values Area.

Calculated Fields are only found in the Pivot Table Report’s Values Area.

The Field List in the sample is shown in the image below. Take note of how the Cost of Goods Sold field is calculated:

1. The Pivot Table Fields task window closes with this option.
2. As demonstrated by the checked checkbox to its left, it is added to the Pivot Table. The Calculated Field is added to the Values box, to be more accurate.



To remove the calculated field, simply drag the calculated field and drop it outside the Pivot Table. You can also uncheck the box located at the left-hand side of the calculated field or you right-click and select Remove (with the name of the calculated field next to it).

Conclusion

So, I have explained here the steps involved in adding the calculated field. You also understood the steps in changing the display of formula error messages.

CHAPTER TWELVE

CREATING PIVOT TABLES FROM IMPORTED FILES – USING THE DATA MODEL

The data model is a method of organizing tables and calculations for usage in PivotTables. The data model was once accessible as a Power Pivot add-in and is now included with Excel 2016+ for Windows. Excel 2016 for Windows is used to provide the rest of this article.

There are various benefits to creating a Pivot Table from the data model instead of a single Excel table. To get us started, here are a few examples.

1. We can create a PivotTable that combines data from different tables.
2. We can build formulas that vastly outnumber those accessible in a standard PivotTable.
3. The formulae are written in a language called DAX, which has a lot of sophisticated features.
4. Using named sets, we may select and pick rows and columns.
5. We can utilize a Get & Transform query (to clean the data before it comes) and link to several data sources (e.g., a CSV file, a database table, and an Excel workbook) in a single model rather than copying/pasting data into a worksheet.
6. We may just Refresh the report in the following times after it has been produced (instead of going through the whole export, clean, import, and merge into a single data table process).

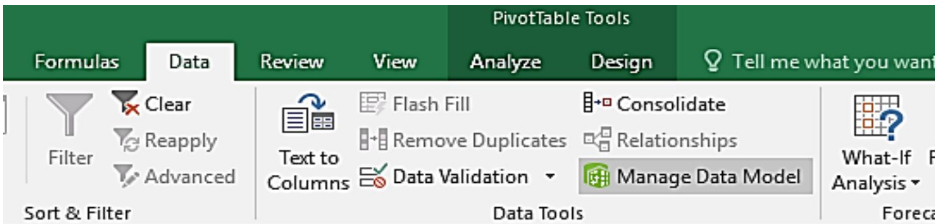
This is only a sampling of the highlights. So, below are the steps that we are going to follow in doing so.

1. Activate the data model.
2. Importing the data model.
3. Define the relationships.

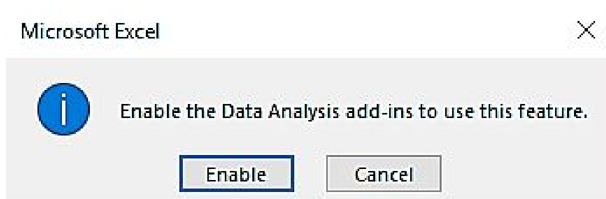
4. Construct the PivotTable

Activate the data model

To enable the data model, simply click the Data tab and select Manage Data Model.



If it is your first time doing this, you will be asked to enable the add-ins.

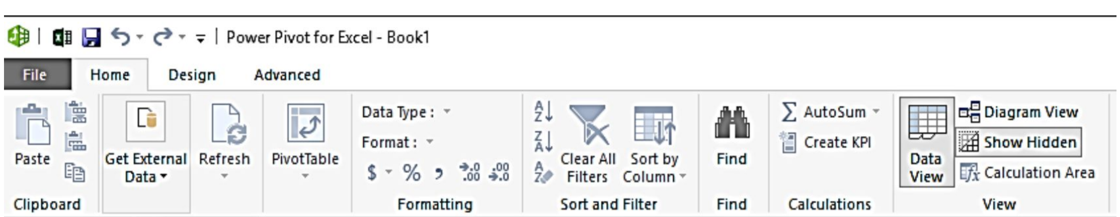


After you have enabled it, you will see the Pivot table tab on the ribbon.

Import the data models

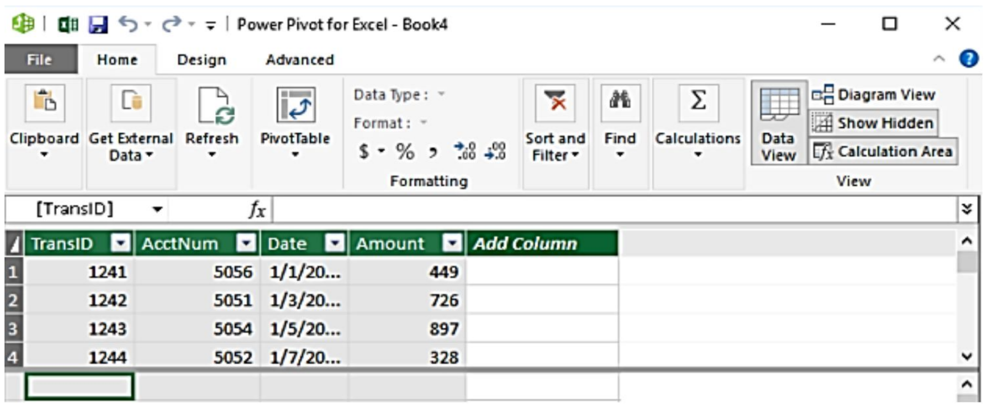
The data tables are then imported. We have certain transactions in a Data Table workbook in our situation. The bank account is included in the transactions, but not the user id. Thankfully, we have a chart of accounts that is kept in the Lookup Table worksheet.

The procedure for importing data tables varies based on the location of your source data. Click the Power Pivot, then select the Manage ribbon command to get started. The Power Pivot window will appear, as illustrated below.



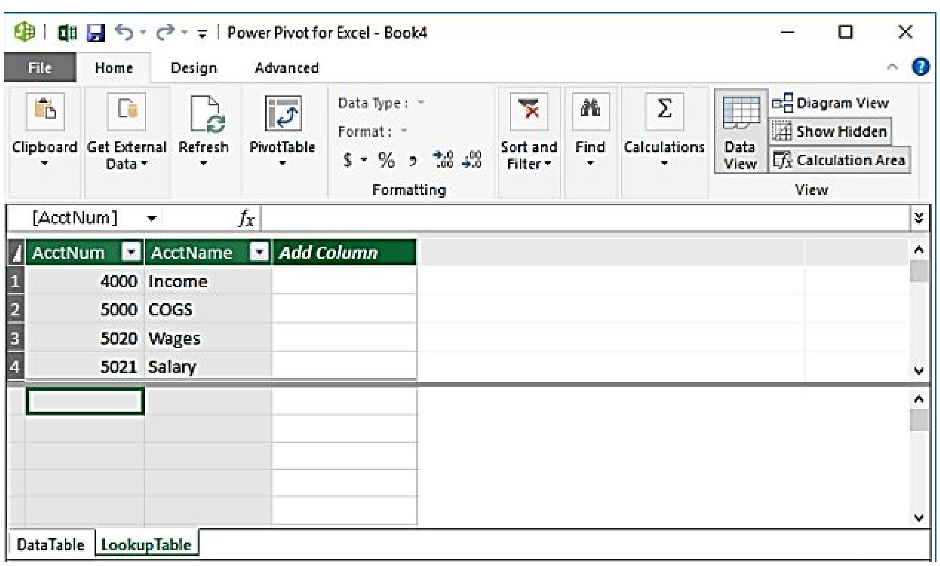
To access the underlying data source, run the Get External Data command.

Because the data is stored in a few Excel files in our situation, we utilize the Get External Data > From Other Sources option and then pick Excel File from the subsequent box. We open the appropriate worksheet and choose the option to use the first row as column headings. After we complete the process, the data is imported into our data model, as seen below.



Note: You should use the Power Pivot > Add to Data Model command if you're constructing a data model within the workbook with the tables.

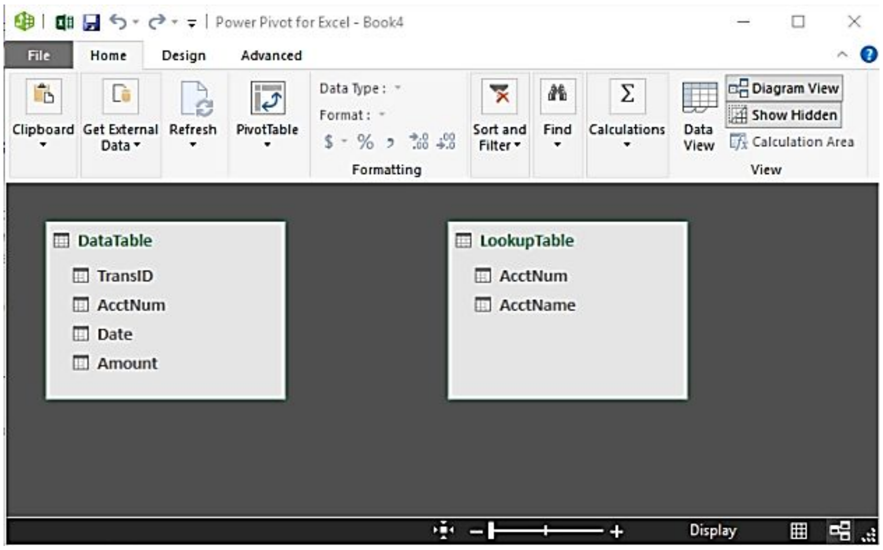
Then we repeat the process using the data from the Lookup Table Excel file. Below is a screenshot of the new Power Pivot window.



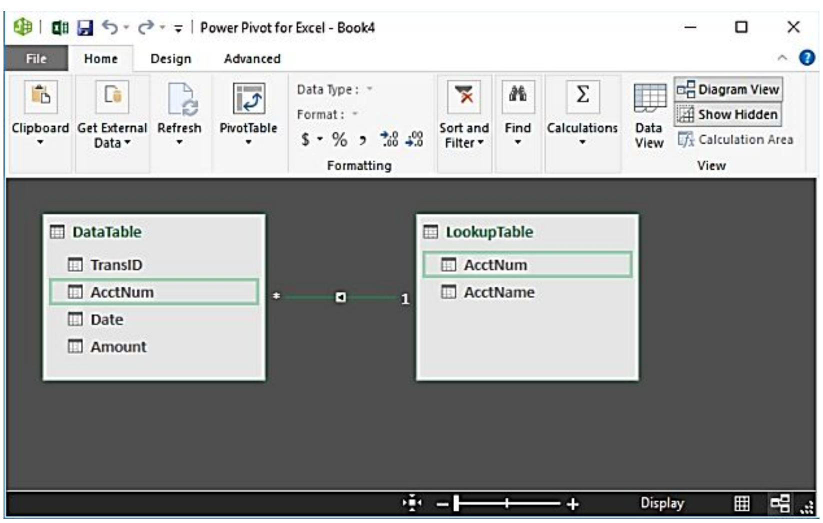
After we've put our data into the data model, we'll need to define the relationships to inform Excel how the tables are connected (which fields are shared between them).

Define the Relationship

Relationships may be defined in a variety of ways; however, my personal preference is to utilize the visual diagram approach. Just tap the Home > Diagram View command to switch between Data View (shown above) and Diagram View (shown below). Instead of viewing the data transactions, we'll see the tables with the column names, as seen below.



To define the relation, drag the column name from the Data Table to the Lookup Table’s associated column. In this scenario, the AcctNum column of the Data Table is linked to the AcctNum column of the Lookup Table. The relationships are shown in Excel as seen below.

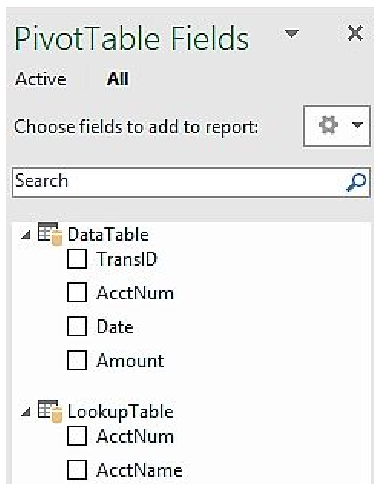


Now, we can create our pivot table.

Construct the Pivot Table

You simply pick a New Worksheet or an Existing Worksheet in the resultant Create PivotTable dialog in the Power Pivot pane by clicking the PivotTable > PivotTable command. When we hit OK, the typical PivotTable field panel appears.

But hold on a second... It seems to be distinct from the usual field panel upon closer study. In most cases, we'll get a list of fields that we may use in the report. But now we can see the tables and expand them to see the fields inside them, as seen below.



Yes, we may choose fields for our report from any or both tables. For instance, we would like the Lookup Table's AcctName in Rows and the Data Table's Amount column in Values. And that's it!

Row Labels	Sum of Amount
Computer software	1238
Internet	897
Meals and Entertainment	449
Office supplies	1792
Postage	1292
Salary	217
Small office equipment	1448
Telephone	352
Trade shows	1966
Travel	1175
Wages	1439
Grand Total	**12265**

So, assuming your initial thought is that it would have been simpler to build a single table using VLOOKUP, I completely understand. Well, here is the point: there's a catch. Because there is just one lookup table in this case, it is pretty straightforward. A chart of accounts, a calendar table, a department list, and other lookup tables are supported by the data model. You may also have numerous data tables in your data model, in addition to multiple lookup tables.

There's also the difficulty of always amending our report. We don't need to supervise several lookup formulae each month since we aren't utilizing VLOOKUP to obtain related data. We may simply Refresh and the new data flows into the report when the external data source is updated, whether for a new account or new transactions. As you may see, this offers up a lot of intriguing options and can help us save time in our workbooks that we use often.

Conclusion

As you can create a pivot table from a single file, so can you create it from an imported file using the data model. And I know that you understood how to do so from the steps and examples I have given above.

CHAPTER THIRTEEN

TROUBLESHOOTING

Pivot Table displaying duplicate values

Whenever you construct a pivot table, it divides your data into groups and generates a total for each group. However, you may come across duplicate entries in the pivot table sometimes.

There is duplication for one of the text elements in the Row section in this sample — Instead of appearing once, Boston appears three times.

	A	B	C	D	E	F
1						
2	Region	East				
3						
4	**Quantity**	**Categ**				
5	**City**	**Bars**	**Cookies**	**Crackers**	**Snacks**	**Grand Total**
6	Boston	1621	2425	496	554	5096
7	Boston	84				84
8	Boston	23	90			113
9	New York	2575	1658	457	282	4972
10	Philadelphia	1860	1472	283	236	3851
11	**Grand Total**	**6163**	**5645**	**1236**	**1072**	**14116**

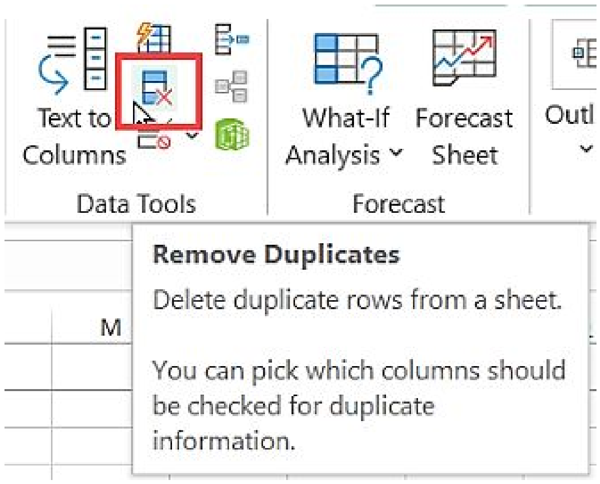
Although these items seem to be duplicated, they vary in certain ways, which is why they display on distinct rows in the pivot table.

Typically, the issue with trailing spaces is that one or more space signs exist at the end of some, but not all, of the data elements. You'll have to fix the source data to get away with the duplicates in the pivot table. Nevertheless, since Excel table filters disregard trailing spaces, it's difficult to locate the problematic data.

It's simple to eliminate all duplicate entries from a list using Excel's Remove Duplicates tool, which is based on items in one or more columns.

However, if the list contains numbers, you may have issues, since duplicates may stay in the list. Let's work with an example;

Choose a cell in the list. Click on Remove Duplicate on the ribbon.



In the dialog box, choose the column where the duplicates will be removed.

Click on the box next to the My Data Has Headers i.e., if it has headers. Click Ok.

Formula – LEN

In Excel, the LEN function is designated as a text function. LEN is a text counter that counts how many characters are in a text or strings. The length function is used to determine the length of a string that includes special characters, space, integers, letters, and other elements. This will count all of the characters in a string, including special characters and spaces.

As output, something always returns a number. By placing the string inside a double quote or refereeing a cell, the string may be directly stated in the function. The LEN function may be used with the cell address if the cell includes the text or string in which you wish to get the count of characters.

Formula – TRIM

The TRIM function is part of the Excel Text functions category. TRIM helps to tidy up the cells in the worksheet by removing superfluous gaps in data.

The TRIM function might be beneficial in financial analysis to remove uneven space from data transferred from other apps.

A few remarks about the TRIM Function:

1. Extra spaces in the text will be removed using TRIM. As a result, just single spaces will be left between words, with no space characters at the beginning or conclusion of the text.
2. It comes in handy when you need to clean up text from other apps or settings.
3. The ASCII space character (32) is the single character that TRIM removes from the text.
4. A non-breaking space character (160) is often seen in Unicode text and appears as an HTML object on web pages. With TRIM, it will not be eliminated.

Conclusion

A pivot table does come with some errors that occur while you work on them. I have explained some of the errors and all you need to know about them.

CHAPTER FOURTEEN

TROUBLESHOOTING

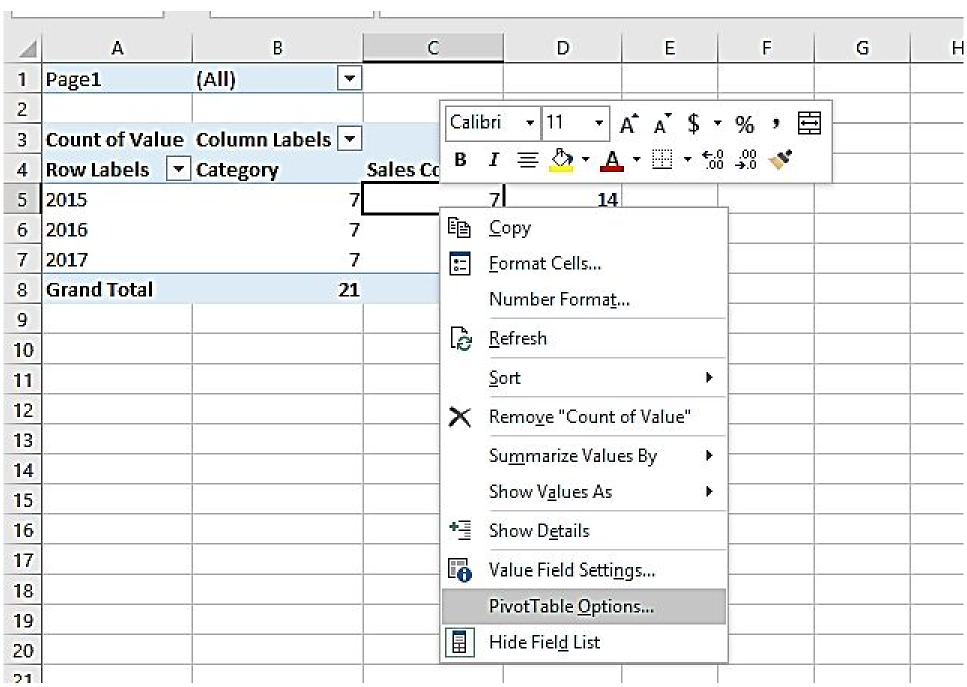
How to resolve common Pivot Table Errors.

Divide by Zero (#Div/0) is the most prevalent sort of error I encounter in pivot table data. You can obtain an incorrect number like a #DIV/0 whenever you conduct a calculation in an Excel Pivot Table!

A calculated field or a computation on a field is usually the source of this issue (show values as an option).

Our pivot tables may become unsightly if we display inaccuracy. Fortunately, the error may be corrected or replaced. When you're delivering crucial information, this looks bad. Fortunately, you may use a custom value or text to overrule this.

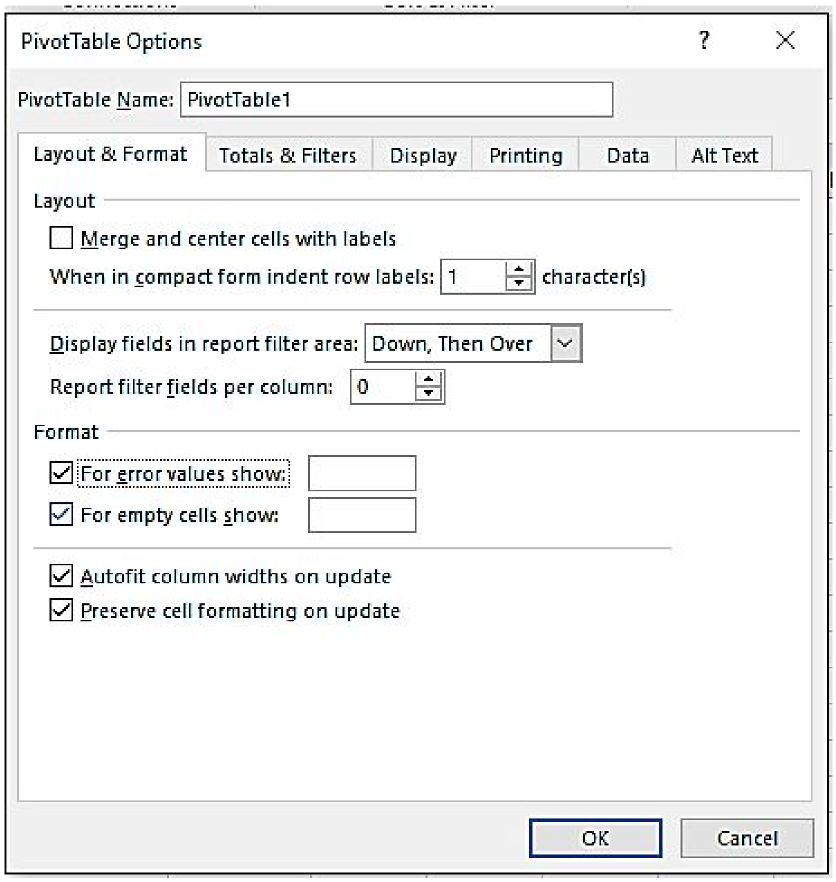
To enable this, right-click on any value in your Excel Pivot Table and choose PivotTable Options.



You may manage the mistakes by using the "For error values show" feature on the Layout & Format tab of the PivotTable Options.

The value in the text box to the right will be shown in the pivot table after the box is ticked. This box may be used to enter a number or text. The pivot table's error values will be substituted with anything you type into the text field.

You may also keep the box empty if you want the pivot table to show an empty cell.



Press Ok. When you uncheck this option, it will show the error again.

The "For error values show option" is disabled by default. This is beneficial since it alerts you to any flaws in your calculations. However, having to modify this setting, or any of the other 30+ pivot table choices, every time you build a pivot table may be inconvenient.

Correcting the Source Reference not Valid Error in a Pivot Table

One or more of the following is most likely the cause of the error:

1. The letters " [" or "] " or square brackets appear in the Excel file name.
2. The file is not stored on the local disk and arrives via email or the internet.
3. The data source for the pivot table is for a range that does not exist.
4. A specified range with an incorrect reference is referenced by the data source.

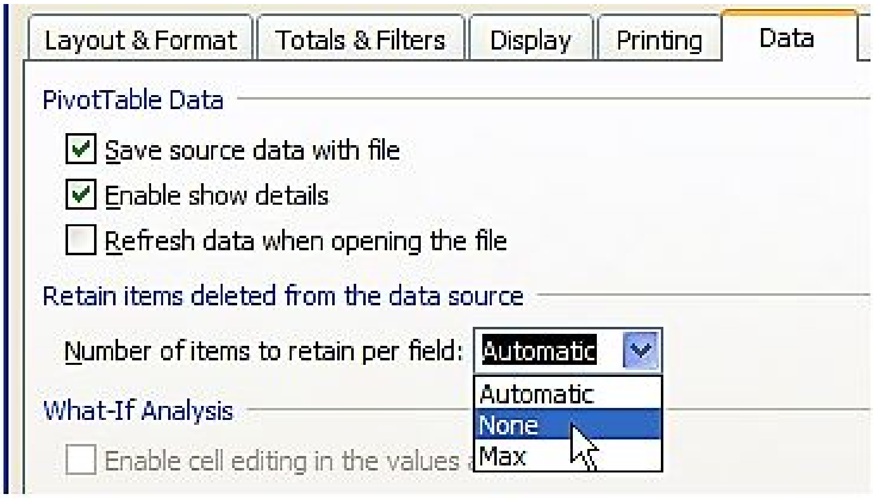
Old items in the Drop-Down Menus

If you reload the pivot table after removing or changing data in the source, the old items may remain in the drop-down lists. Even though all of the sales data were altered, the Central region remains in the Area heading drop down after it was amalgamated with the East region.

You can address this by changing a pivot table configuration to prevent outdated data from being saved in the pivot cache.

You may alter an option setting to prevent outdated items from being kept in a pivot table:

1. Any cell in the pivot table can be selected by right-clicking it.
2. Select PivotTable options from the drop-down menu.
3. Select the Data tab in the PivotTable Options dialog box.
4. Select None from the drop-down list in the Retain Items section.
5. The pivot table will be refreshed after you click OK.

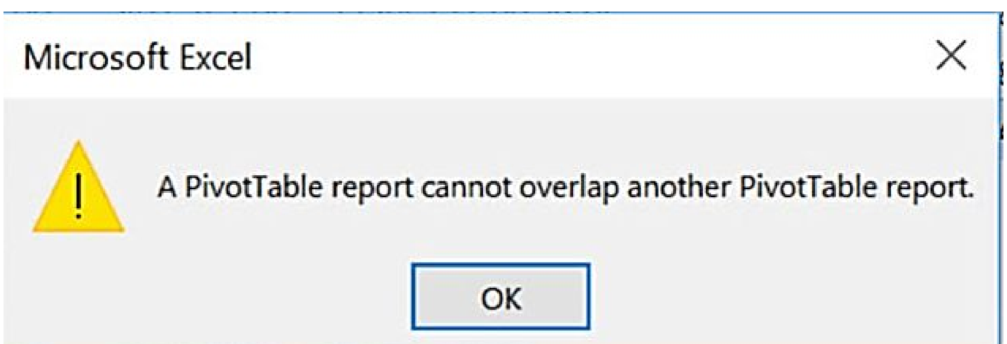


You may manually delete the old items from the drop-down lists instead of updating an option setting:

1. Ungroup any groups that incorporate the old items that you manually established.
2. The pivot table's pivot field should be removed.
3. Refresh the pivot table by right-clicking on it and selecting Refresh from the menu.
4. Re-insert the pivot field into the pivot table.

Overlap Errors

The error “PivotTable Report cannot overlap” means your pivot table is attempting to extend vertically or horizontally. This will result in data overlap with another pivot table. The pivot table throws the following error notice as a warning concerning pivot table overlap issues.



Some of the primary causes of the Excel error code pivot table that cannot overlap are listed below.

- When you have numerous pivot tables on the same page in your Excel document. However, the pivot table you've chosen to refresh could not be the one with the issue.
- When a pivot table doesn't have enough room to display its data and can't overlap with another pivot table.
- When there isn't enough vacant space for the PivotTable to expand for new data, you'll receive this PivotTable Report Cannot Overlap Error notice.

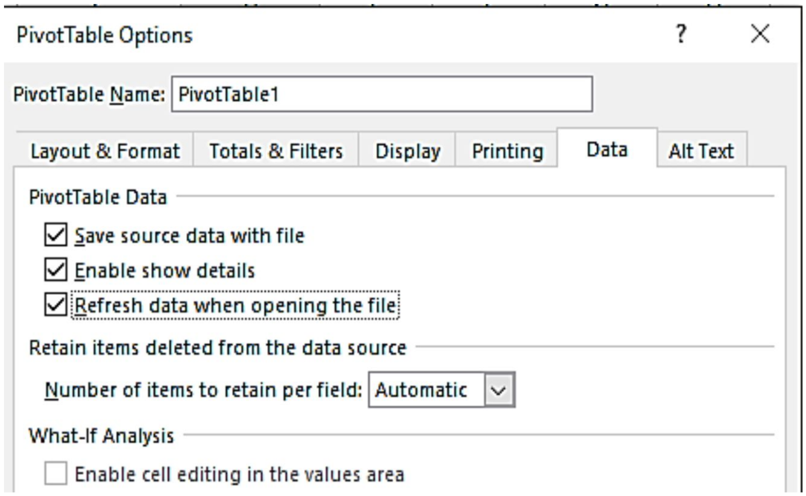
How to fix it

We all have a bad habit of not refreshing data after making changes. Moreover, if your pivot table is connected to an external source, you'll want to display your visitors the current values. After you've opened your file, you'll need to refresh the Excel Pivot Table.

Here's how to go about it:

Solution One

1. Pivot Table Tools will appear on your Excel ribbon if you tap anywhere within your Pivot Table.
2. Then right-click and select Pivot Table options.
3. Select the checkbox "Refresh data on opening the file" on the Data tab.

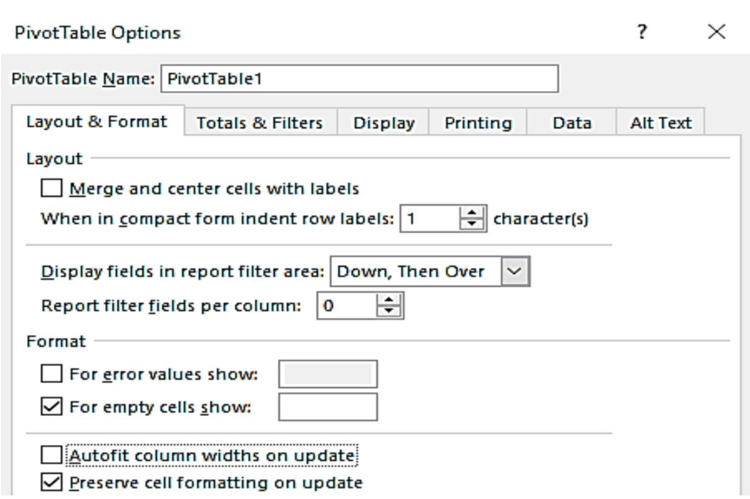


Solution Two

You can also resolve this error by disabling AutoFit. Pivot tables utilize the "Autofit column width" feature by default. Whenever you modify the data, you may adjust the column width, however, when you refresh the pivot table, it will revert to Autofit.

You must deactivate the Autofit default as follows to retain direct formatting:

1. Right-click anywhere in your pivot table and choose "Pivot Table" from the drop-down menu.
2. Select "Layout & Format" from the drop-down menu.
3. Within the "update" tab, uncheck the "Autofit column widths" option.



4. Then press the OK button.

The "Autofit" feature of the pivot table must be disabled.

After you disable this feature, custom "column widths" will persist after you reload the page.

Solution Three

Refreshing regularly can also be of help. Whenever the data is too complicated or the Excel pivot table is one of the dashboards's components, you'll need to refresh frequently. Excel offers capabilities that allow you to effortlessly update pivot table data on a frequent basis so that visitors always see the most up-to-date information.

To construct a pivot table inside the data model, follow the steps below and save it.

1. Within the data set, tap anywhere.
2. Toggle to the Insert Tab. Select the PivotTable option from the Tables group.
3. Select the "Add this data to the Data Model" option from the opened dialog box.
4. If you need to make any further adjustments to the settings, you may do so.
5. Toggle the OK button. (Adding data to the data model, on the other hand, will just take a minute.)
6. Within the data model, add several additional pivot tables.

You should generally configure the PivotTable at this stage. When you're finished, make the following adjustments to the interval:

1. Within the Pivot table, tap anywhere.
2. Select the contextual Analyze tab from the Data group. On the "Change Data Source" drop-down menu, choose "Connection Properties."

3. In the Refresh control area of the opened dialog box, choose the Refresh every option. On the right, enter the minute interval.
4. Then press the OK button.
5. In minutes, set the time interval.
6. For "external data sources," such settings are quite useful.

How Do I Figure Out Which Pivot Tables Overlap?

It's often pretty simple to locate and resolve an Excel pivot table issue. However, finding the exact location of the issue in a large Excel worksheet with several pivot tables and multiple data sources has proven to be quite challenging.

If you want to retrieve a list of all the pivot tables in your worksheet, together with information like where they are, how big they are, and what data they use, you may use this function. Then you'll need to utilize the "List All Pivot Table – Information" macro, which will display all of your pivot tables' details.

This macro, for example, shows practically every pivot table detail in your Excel file, including the size, source data, and position.

If the data source is a worksheet list or a table in the same Excel workbook, the macro will additionally display information about it.

When multiple pivot tables use the same data source, the error This PivotTable report cannot overlap another PivotTable report occurs. The pivot table that uses the same data source is updated at the same time by default. Even if you're just updating one pivot table at a time.

So, if you're getting this Excel pivot table cannot overlap error because you're using the same data source, first address this issue. Only Excel will enable you to reload non-problematic pivot tables after that.

CONCLUSION

There are lots of errors that can occur in a Pivot Table as you work with them. It depends on how you do so. In this chapter, I have listed the errors that are likely to occur in a Pivot Table as well as how to resolve them. So, use the step-by-step processes in this chapter to resolve those issues.

BOOK 4:

EXCEL POWER PIVOT & POWER QUERY

CHAPTER ONE

INTRODUCING POWER PIVOT

Power Pivot is an Excel add-in that can be used to do an advanced analysis of data and model creation. It can handle massive amounts of data (thousands and thousands of rows) from a multitude of different sources, all in one Excel document. You may develop a Data Model, which is a grouping of tables with connections, in both Excel and Power Pivot. The data model in an Excel worksheet is the same as the data model in the Power Pivot interface. Every dataset you upload into Excel is also accessible in Power Pivot.

Every data that users deal with in Excel, as well as the Power Pivot window, is saved in an analytical database within the Excel worksheet, which is loaded, queried, and updated by a prominent local engine. Since the data is in Excel, users can use PivotTables, Pivot Charts, Power View, and other Excel capabilities to combine and engage with it right away. Excel is responsible for all data display and interaction, and both the data and the Excel presentation objects are housed inside the same workbook file. Power Pivot allows you to deal with documents up to 2Gigabytes in size and up to 4 Gigabytes of data in memory.

Workbooks that you alter using Power Pivot may be accessed in the same way that some other documents can be accessed. However, exporting your workbook to a SharePoint environment with Excel Services enabled provides even more advantages. Excel Services analyses and presents data in a web browser so that others may study it on the SharePoint server.

Understanding the Power Pivot Internal Data Model

Power Pivot is a SQL Server Analysis Services engine that is made accessible via an in-memory procedure that operates inside Excel. Internal Data Model is the term used to describe it. The Power Pivot Ribbon interface is the most efficient method to deal with the Internal Data Model.

You may construct a Data Model, which is a group of tables with relationships after the Power Pivot add-in is installed and accessible. Any data you bring into Excel or already have in Excel becomes accessible in the Power Pivot window after it has been added to the data model. Over and beyond the conventional Excel Data tab, the Power Pivot Ribbon provides extra functionality.

Now let us take a glance at how Power Pivot fits into the entire Business Intelligence workflow and how it interacts with the other BI tools in Excel to get a sense of where it fits in when utilizing Excel for analysis of data or presentation.

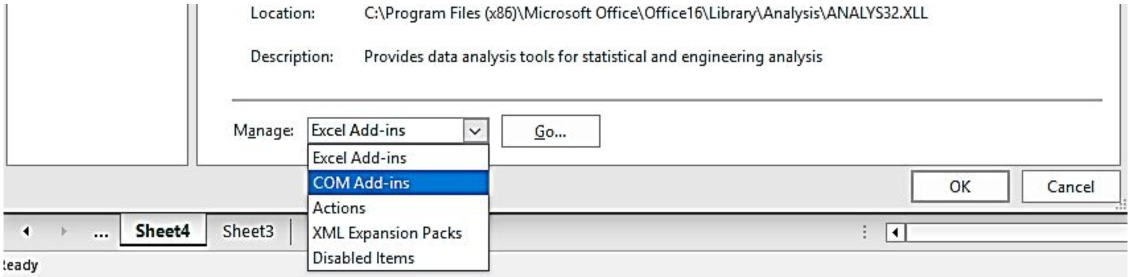
Because Power Pivot is a data model, the first step is to import some data. You'll need a tool or connector to connect to various sorts of data sources and get your data unless it's already in your Excel sheet. Depending on your data source, this may be a complicated issue that is beyond the scope of this essay.

After you've got the data, you'll have to clean it up and modify it. Another Excel add-in called Power Query does both of these capabilities. The Power Pivot data model is created as the last stage. This is where we make the connections between the various data tables.

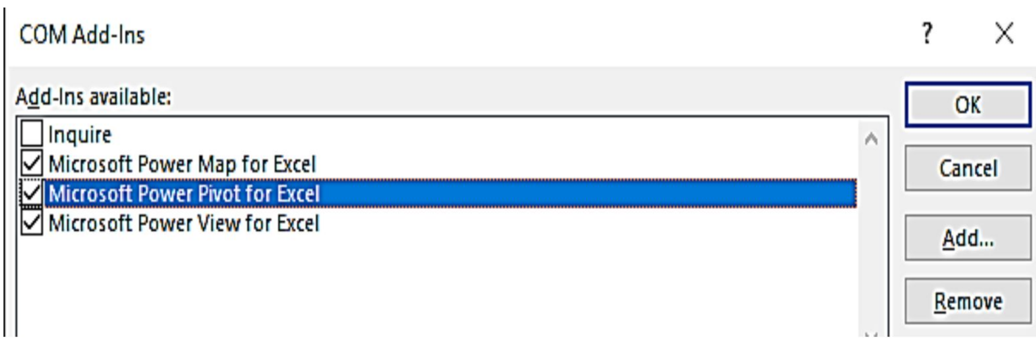
Lastly, once you've calculated all of the required metrics, you can use Pivot Tables and/or Pivot Charts to summarize the data in your Power Pivot data model. A dashboard can be created by combining multiple Pivot Tables / Pivot Charts with slicers.

Activating the Power Pivot Ribbon

1. To activate Power Pivot in Excel, access the backstage view by clicking the "File" button inside the Ribbon.
2. Secondly, on the bottom left of the backstage view, choose the "Options" section to access the "Excel Options" box.
3. Choose the "Add-Ins" option on the left flank of this window.
4. Pick "COM Add-ins" out from the "Manage" drop-down just at the bottom right-hand side of this window.



5. Next, to access the "COM Add-Ins" panel, select the adjoining "Go..." button.
6. Tick the box on the "Microsoft Power Pivot for Excel" add-in in this window.



7. Now, on the right, press the "OK" button to activate the add-in.

Linking Excel Tables to Power Pivot

In only a few minutes, you may attach the Excel table to Power Pivot. Make an Excel table containing the information. On the Ribbon, choose the PowerPivot tab. In the Tables category, click Add to Data Model. The Excel table is connected to the PowerPivot Data Table of the same name.

Preparing the Excel Tables

While any huge piece of data may be transformed into a pivot table, it's critical to prepare your Excel data in preparation for PivotTables evaluation. Otherwise, you risk encountering flaws or inconsistencies that cause your data to be misrepresented.

To guarantee that your pivot table produces the results you want, follow these guidelines.

1. Make a distinct heading for every column in your dataset. Instead of using "Name" for both, provide "First Name" and "Last Name."
2. Give each column a classification, such as money or time. To do so, click the symbol above the column to select the whole column. Then, with the drop-down box inside the Numbers category on the Home tab, choose the correct classification. You can also style your data by choosing the Number tab after right-clicking the column and picking Format Cells. You'll be able to select your classification and customize how the data is presented.
3. Totals, averages, subtotals, and the like should not be included in the data. Calculations will be considerably easier to create using pivot tables.
4. Erase all of the data's blank cells. If there are any empty cells in the supplied data, an error notice will appear in the results. To get rid of blank cells, type "not available" or "n/a." Shift key + Down Arrow is a quick technique to discover blank cells. This will shift you to another empty cell in the column instantly.
5. Delete any data that is repeated. The findings of repeating data will be wrong. While certain data may recur (for instance, goods in total sales), multiple inputs for a single occurrence should be avoided.
6. Delete all of the data's filters. Within the pivot table, filters may be built. The Sort & Filter function in the Editing section on the Home tab may be used to change filters.
7. Any clustered cells should be ungrouped. To group data, await till you've generated your pivot table. The Ungroup function in the Outline category on the Data tab may be used to remove clustered cells.
8. Your data should be formatted into a table as the last step before building your pivot table. Select Format as Table from the Styles category on the Home tab once you've highlighted all of your data.

Adding your Excel tables to the data model

In Excel, a PivotTable may only be created from a single table or range. You may use the Data Model to add new tables to the PivotTable if necessary.

Assume your workbook has two worksheets.

- The first is a table that contains the data of salespeople and the territories they represent.
- The second contains sales data by area and month

Salesperson	Region
Albertson, Kathy	East
Brennan, Michael	West
Davis, William	South
Thompson, Shannon	North

Region	Month	Order Amount
East	January	$925.00
East	February	$875.00
East	February	$500.00
East	March	$350.00
West	January	$400.00
West	January	$850.00
West	January	$1,500.00
West	February	$550.00
West	March	$400.00
South	February	$235.00
South	January	$850.00
South	March	$600.00
South	January	$250.00
North	January	$875.00
North	January	$265.00
North	February	$375.00
North	February	$1,345.00
North	March	$300.00

The sales may be summarized per salesperson as shown below.

- Sales may be accessed by clicking the table.
- Choose the INSERT tab.
- Inside the Tables category, choose PivotTable.

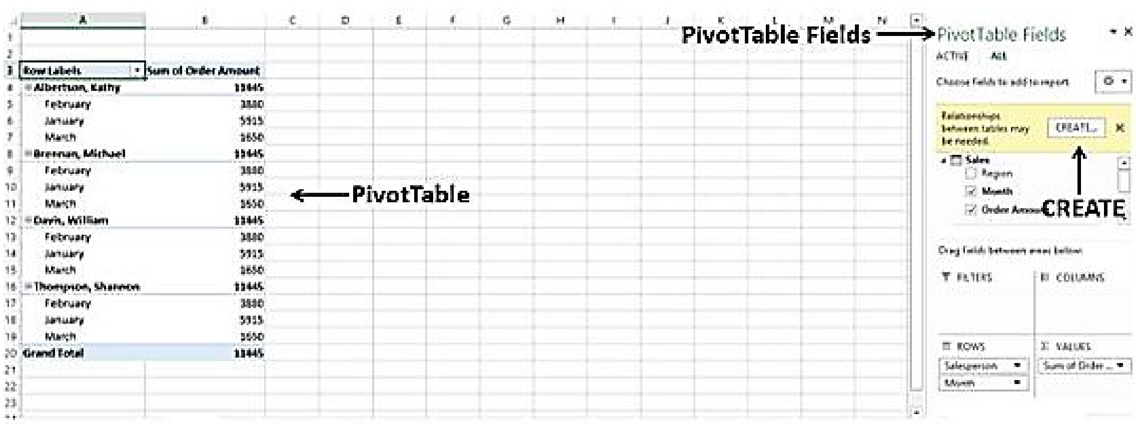
A blank PivotTable will be constructed using the variables from the Sales data – Region, Month, and Order Amount. Underneath the PivotTable Fields list is a MORE TABLES command.

selecting more tables.

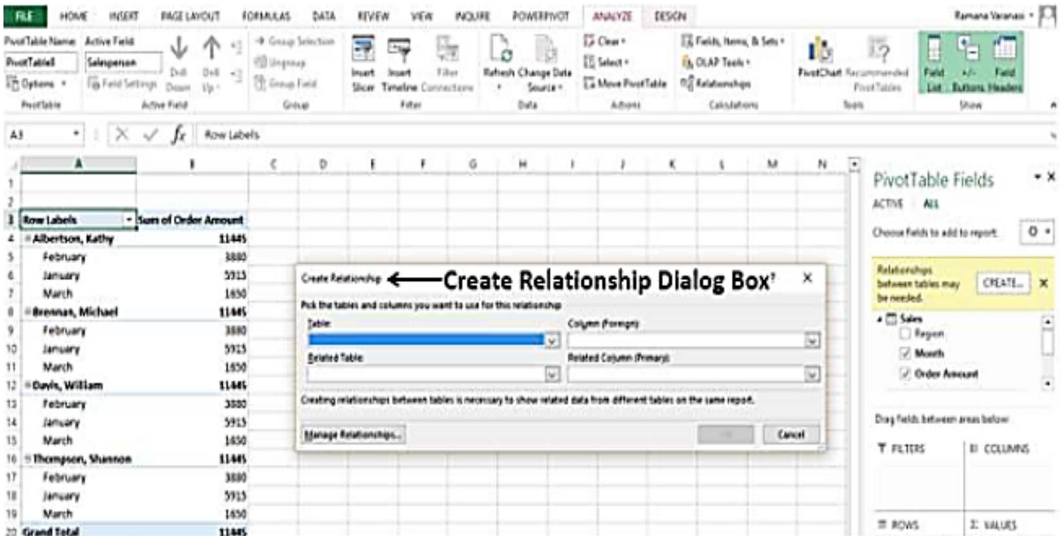
The dialog box Create a New PivotTable opens. To leverage several tables in your analysis, a new PivotTable must be built using the Data Model, according to the information provided. Select Yes. A new Pivot Table will be created.

You'll see that there are two tabs under PivotTable Fields: ACTIVE and ALL.

- Click the ALL tab.
- In the PivotTable Fields list, there are two tables: Sales and Salesperson, each with its own set of fields.
- Drag the Salesperson field from the Salesperson table to the ROWS area.
- Drag the Month field from the Sales table to the ROWS area.
- Drag the Order Amount field from the Sales table to the VALUES box.

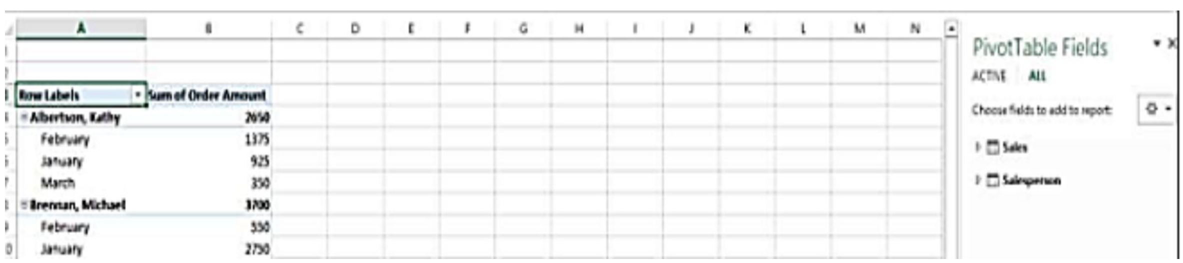


The PivotTable is now ready to use. A notification occurs in the PivotTable Fields stating that table relationships may be required. Besides the message, select the CREATE button. The dialog box for creating a relationship displays.



- Choose Sales from the Table drop-down menu.
- Choose Region from the Column (Foreign) box.
- Choose Salesperson from the Related Table drop-down menu.
- Choose Region from the Related Column (Primary) box.
- Choose the OK button.

The PivotTable has been created from two tables on separate spreadsheets.



Importing tables versus views has advantages and disadvantages.

Tables provide the advantage of clearly stated connections. Whenever you import tables, Power Pivot can detect the connections between them and reproduce them in the Data Model instantly. Tables are also much more accessible, enabling you to view all of the raw data without being manipulated. Whenever you import tables, nevertheless, you must have a basic grasp of the database structure as well as how the contents in the tables are used in the framework of your company's business requirements. Furthermore, importing a table imports all columns and entries, whether or not you use them. It typically compels you to take the additional step of manually filtering out all the columns you don't want in order to maintain the complexity of your Power Pivot Data Model reasonably.

Because views are already tailored to contain just the columns and data that are required, they are frequently simpler datasets. Furthermore, you are not required to have a thorough understanding of the database structure. Someone with that expertise has previously completed the task for you, including joining the right tables, applying the necessary business processes, optimizing output, and so on.

Something you lose with views is Power Pivot's ability to detect and develop connections inside the Data Model dynamically. You also lose visibility since you probably wouldn't be able to see precisely what the view is doing to arrive at its finished product if you just do not have the permissions to access the views in design mode.

When feasible, it's regarded as a recommended method to utilize views rather than tables. They may help you simplify your Power Pivot Data Model by restricting the quantity of data you import. Tables, on the other hand, are by no means sneered upon and are sometimes the only alternative owing to a lack of database privileges or preset views. It's possible that you'll need to import both tables and views from the same database.

Creating relationships between your Power Pivot Tables

Dealing with several tables adds intrigue and relevance to the data in the PivotTables and reports that utilize it. When you're utilizing the Power Pivot add-in to deal with your data, you can utilize Diagram View to establish and manage relationships between the tables you loaded.

In order to create table connections, each table must have a column with corresponding values. If you're linking Customers and Orders, for instance, each Order record should include a Customer Code or ID that points to a specific customer.

1. Click Diagram View in the Power Pivot window. The tables are immediately sorted based on their connections, and the Data View worksheet style switches to a visual diagram structure.

2. Build a relationship by right-clicking a table diagram and selecting Create Relationship. The dialog box for creating a relationship appears.
3. A column is preselected if the table comes from a relational database. Pick a column from the database that includes the data which will be utilized to connect the rows in each table when no column is pre-selected.
4. Pick a table with at least 1 column of data that is connected to the table you just chose for Table for Related Lookup Table.
5. Choose the column that holds the data that is associated with the Related Lookup Column from the Column drop-down menu.
6. Select Create from the drop-down menu.

When you've created or imported a table for each topic in your Data Model, you'll have to allow the coming together of related data in Excel whenever you need it again. This is accomplished by guaranteeing that linked tables have similar fields and by creating connections among tables. It allows Excel analysis tools like Pivot Tables to pull data from multiple tables.

***NB**: Despite the fact that Excel verifies if the data categories in each column correspond, it doesn't validate that the columns comprise corresponding data and will build the connection even though the values do not match. Construct a PivotTable that includes fields from both tables to see if the connection is genuine. If the data seems to be incorrect (for instance, blank cells or a similar value repeated down each row), you'll choose alternative fields and maybe different tables.*

Finding a related Column

It might be difficult to decide the columns to employ in a table connection when data models have a big variety of tables or tables comprised of a significant number of fields. Searching for a similar column inside the model is one option. This method is handy if you identify the column (or key) you want to utilize but aren't certain if the column exists in other tables.

A data warehouse's fact tables, for instance, usually have a lot of keys. Begin with a keyword in that table and check the model for additional tables with the same key.

In a table connection, any table with a matching key may be utilized.

1. Select Find on the Power Pivot window.
2. Input the key or column as a search word in Find What. The field name must be included in the search words. You can't search for a column's attributes or the kind of data it includes.
3. When you're looking for metadata, check the Show hidden fields option. You may not notice a key in the Diagram view if it was buried to minimize clutter in the model.
4. Then, choose Find. If a similarity is discovered, the column in the table diagram is emphasized. You should know which table has a corresponding column for a table connection.

Modifying your active relationship.

Several connections may exist between tables, but only one of them can be active. In DAX computations and Pivot report navigation, the active relationship is utilized by default. The USERELATIONSHIP function in DAX may be used to calculate inactive relationships.

Numerous connections occur if the tables were imported this way, if the original data source declared several connections for that table, or if you dynamically construct extra relationships to accommodate DAX computations. Advance an inactive connection to modify the active relationship.

The existing active connection is immediately deactivated.

1. Navigate to the table-to-table connection line. A dotted line represents an inactive connection. (The connection is inactive since the two columns already have an indirect link.)
2. Set the line as active by right-clicking it and selecting Mark as Active.

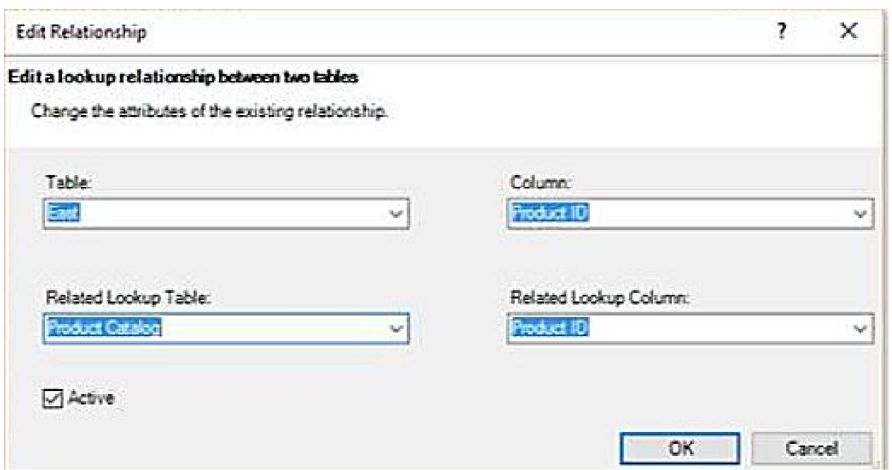
__NB:__ The connection can only be activated if there is no other connection between the two tables. If tables are already connected, but you wish to modify the way they are connected, you must first deactivate the existing connection before activating the fresh one.

Managing existing relationships

There are ways you can manage your existing relationships. You can edit (make changes) or delete them.

To make changes to a relationship, follow the steps below:

1. Select a relationship by clicking on it.
2. Select the Edit option. A dialog window called Edit Relationship displays.



3. Make the necessary adjustments to the connection.
4. Click the OK button. The connection alters as a result of the changes.

To delete a relationship, simply

1. Select a relationship by clicking on it.
2. Select the Delete option. A warning notice displays, describing how removing the connection may impact the tables and reports.
3. If you're sure you want to delete, click OK. The specified relationship is removed from the list.

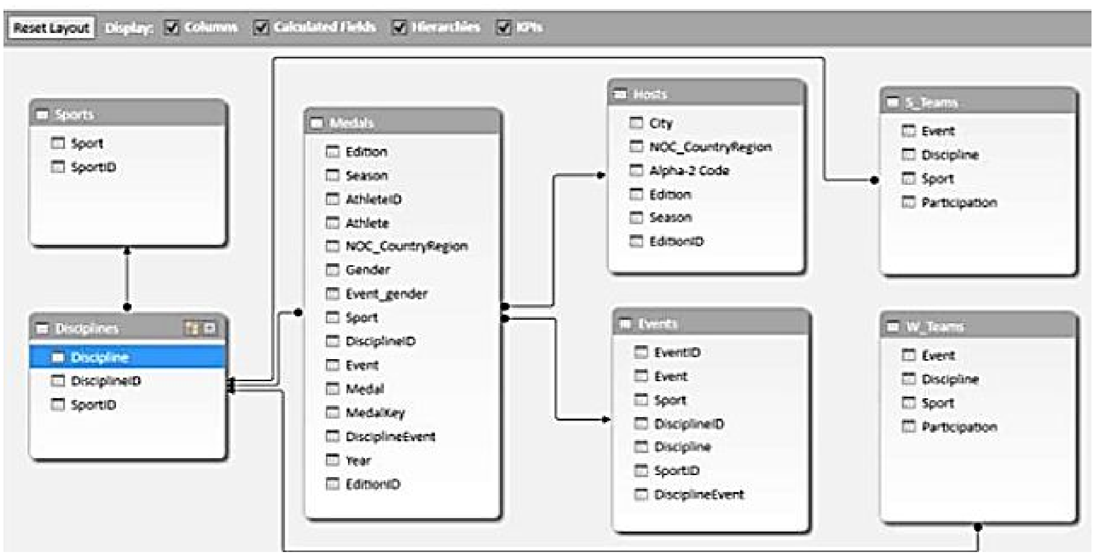
Using Power Pivot data in reporting

Using Power Pivot Data in Data Model, you may generate visually appealing reports for your data processing.

The most significant characteristics are:

- Pivot Charts may be used to create visual reports from your data. Report Designs may be used to organize your PivotTables and render them more legible.
- Slicers may be used to filter data in the report.
- A single Slicer may be used for both the PivotChart and the PivotTable in the same report.
- You may select to hide the Slicers from the display when your official report is complete.

You'll learn how to generate reports using Power Pivot's settings. For example, have a look at the Data Model below.



The image above will be our sample for this topic.

Power PivotChart-based reports

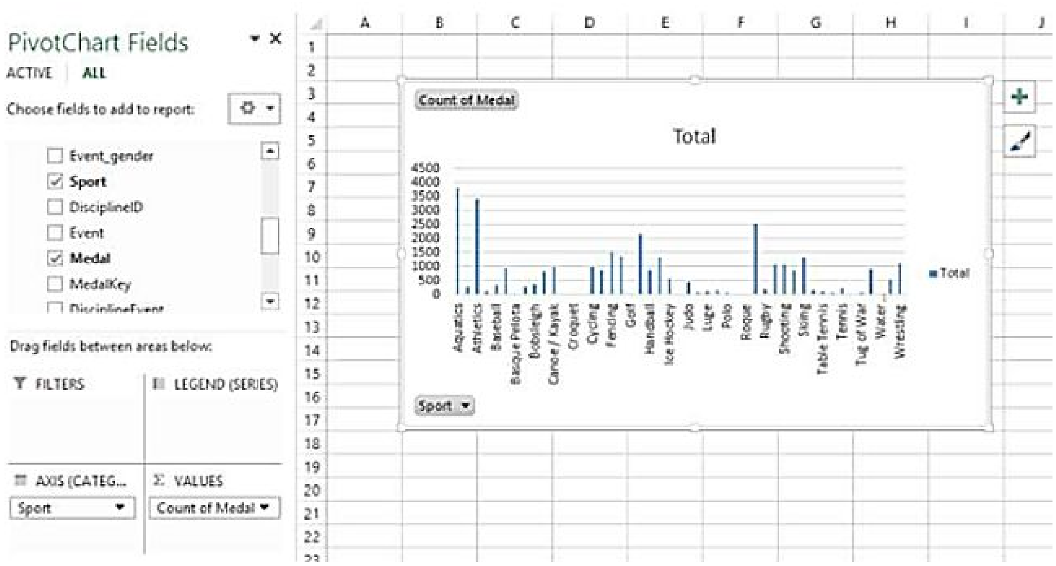
Constructing a Power PivotChart by following these steps:

- In the PowerPivot window, choose the Home tab on the Ribbon.

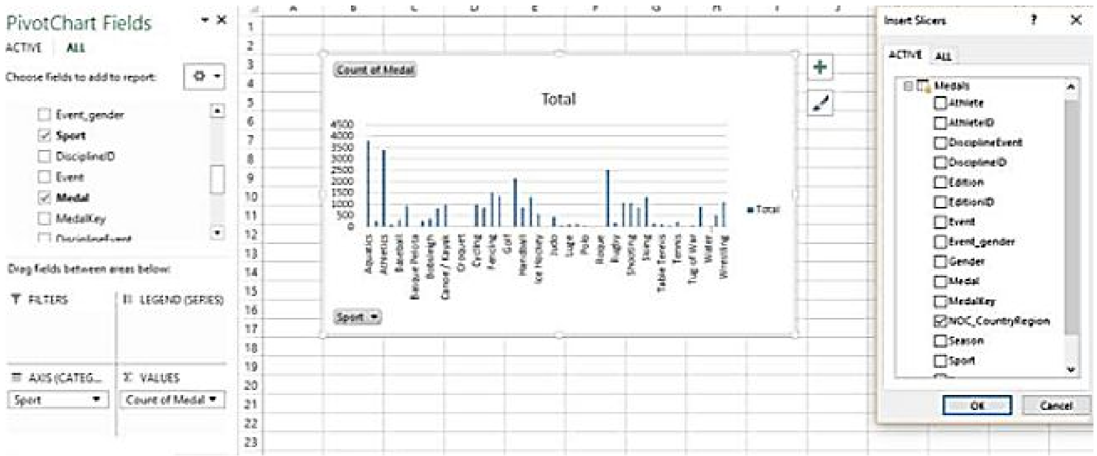
- Select PivotTable.
- From the selection menu, choose PivotChart.
- Inside the Create PivotChart popup, choose New Worksheet.

In the Excel window, a new worksheet is generated with a blank PivotChart.

- Move Sport to the Axis area from the Medals table.
- Move a medal from the Medals Table into the VALUES section.



- On the Ribbon, choose the ANALYZE tab under PivotTable TOOLS.
- In the Filter Group, choose Insert Slicer. The dialog box Inset Slicers displays.
- In the Medals table, choose the field NOC CountryRegion.
- Click the OK button.



Loading data from other data sources

There are two methods to get data into Power Pivot.

1. Data should be loaded into Excel and then added to the Data Model.
2. Directly load data into PowerPivot, creating the Data Model (the PowerPivot database).

When you want the data for Power Pivot without Excel realizing it, do it using the second approach. It is because the data will only be loaded once and in a very compacted format. You may either load data from numerous data sources into the Power Pivot Data Model or create and/or leverage connectivity. The corresponding data sources are supported by Power Pivot:

1. SQL Server relational database
2. Microsoft Access database
3. SQL Server Analysis Services
4. SQL Server Reporting Services (SQL 2008 R2)
5. ATOM data feeds
6. Text files
7. Microsoft SQL Azure
8. Oracle
9. Teradata
10. Sybase
11. Informix
12. IBM DB2

13. Object Linking and Embedding Database/Open Database Connectivity
14. (OLEDB/ODBC) sources
15. Microsoft Excel File
16. Text File

Loading data from a relational database

Among the most prevalent data sources utilized by Excel users, is relational databases. It's not hard to locate a researcher who works with Microsoft Access, SQL Server, or Oracle databases on a regular basis. We'll go through how to load data from different database systems in this part.

Loading data from SQL Server

To fully comprehend PowerPivot's capabilities, we must first input data from several sources into the PowerPivot worksheet before doing an analysis. We'll start by importing data from a SQL Server database. I'll be working with **Microsoft's Contoso data warehouse** example.

Choose **From SQL Server** from the **From Database option** inside the PowerPivot worksheet.

This launches the Table Import Wizard, which will walk you through setting up a SQL Server relationship. Input or pick the SQL Server instance name and the database name through which you will import data on the Connect to a Microsoft SQL Server Database page. Regardless of whether Windows-integrated or SQL Server, use the proper authentication mechanism. Next should be selected.

You may select from a range of tables or views accessible from the database you chose on the **Choose How to Import The Data page**, or you can construct your personal custom SQL expression to extract the rows to import. For this demonstration, I'll simply select the data to import from a selection of tables and views and press Next.

Choose the tables out of which you wish to import data on the Select Tables and Views page. To show importing a huge number of entries from inside the PowerPivot worksheet, I'll use the **FactOnlineSales** table.

Remember that the **FactOnlineSales** table in the example Contoso database has more than 12.6 million entries, so ensure you have enough RAM on your desktop if you want to import all of the information.

You may modify the tables name you picked on the worksheet to make them more understandable, and you can even filter the columns to just show the ones you wish to import. I'll just utilize the default settings and import all of the rows and columns in this instance. To begin the data import procedure, select Finish.

The Importing page will show you how far along the import procedure is. After all of the data has been properly imported, select Close to exit the Table Import Wizard. There are 12.6 million records in the **FactOnlineSales** database that PowerPivot has imported.

It's worth noting that the PowerPivot add-in allows you to import millions of entries. You may now classify and filter the data in the same way that you would in Excel.

Loading data from flat files

The phrase "flat file" applies to a file that includes tabular data but has no hierarchical hierarchy or relationships between items. Excel and text files are the most prevalent forms of flat files. Flat files hold a lot of vital information. You'll learn how to import various flat file data sources into the Power Pivot Data Model in this part.

Loading data from Excel files

You may construct a linked table if your source data is in an identical workbook as your data model. Connected tables have a benefit over other forms of imported data including that they react very instantly to modifications in the source data inside the worksheet. When you alter the data from one of the workbook's tables, the connected table in the Power Pivot Data Model updates as well. It's good to get the real-time interaction that linked tables provide.

The source data needs to be retained in the same workbook as the Power Pivot Data Model, which is a disadvantage of linked tables. It isn't always feasible to do so. You'll come into a lot of situations when you need to use

Excel data in your analysis, but the data is stored in a different workbook. You may link to external Excel files using Power Pivot's Table Import Wizard in certain circumstances.

Take the following steps:

- On the Home tab of the Power Pivot interface, select the **From Other Sources** option.
- Choose the Excel File option in the Table Import Wizard dialog box and press the Next option.
- Provide the wizard with the information necessary to link to your desired worksheet. Once you're finished, select Next.
    - **Friendly Connection Name**: This field enables you to give the external source a unique name. Add a comprehensive and easy-to-understand name.
    - Enter the complete path to your target Excel workbook in the **Excel File Path field**. You may use the Browse option to look for and pick the worksheet from which you wish to extract data.
    - **Use the first row as column headings**: Your Excel data will almost always contain column headers. To ensure that your column headers are identified as headers when imported, click the Use First Row as Column Headers check box.
- Choose the worksheets you wish to import in the Select Tables and Views window.
- Inside the Friendly Name column, you may give the table a new title that would be utilized in Power Pivot to refer to it.

NB: *Power Pivot is unable to recognize individual table objects while receiving from external Excel files. As a consequence, the Table Import Wizard only allows you to pick complete worksheets. Taking this into account, ensure you only import spreadsheets with a single data range*.

- If you ever need to filter out undesired columns and records, choose the Preview & Filter option.
- To complete the import procedure, click Finish.

Constantly check and develop connections with any additional tables you've added to the Power Pivot Data Model.

Loading data from text files

The format termed comma-separated values is among the most used data representation methods (CSV). Every data row/record is expressed as a text line, with commas between the columns/fields. Several databases allow you to save your data as a CSV file.

You must select the Text File option if you wish to import a CSV file into Power Pivot.

Assume you have the following CSV-formatted text file:

```
S. No., Employee Name, Employee Designation, DOJ, Employee Salary

1, Albertson Kathy, Manager, 4/5/2006, 2500000

2, Brennan Michael, Assistant Manager, 3/15/2010, 1600000

3, Davis William, Supervisor, 2/25/2014, 1300000

4, Dumlao Richard, Engineer, 6/10/2010, 700000

5, Flores Tia, Senior Engineer, 8/8/2013, 900000
```

1. Select the PowerPivot tab
2. In the PowerPivot panel, choose the Home tab.
3. In the Get External Data category, choose From Other Sources. The Wizard for Importing Tables appears.
4. Scroll to Text Files at the bottom of the page.
5. Then choose Text File.
6. Then press the Next button. With the display Connect to Flat File, the Table Import Wizard opens.

7. In the File Path window, go to the text file. The first line of a CSV file generally contains column headings.
8. Select the checkbox. If the first line includes headers, use the first row as column headers.
9. The default in the Column Separator box is Comma (,), but if your text file contains some other operator, like Tab, Semicolon, Space, Colon, or Vertical Bar, choose it.
10. There is a glimpse of your data table, as you can see. Finish by clicking the Finish button.

Loading data from the clipboard

Assume you got data in an application that Power Pivot does not identify as a data source.

You have two choices for loading this data into Power Pivot.

1. Copy the data to an Excel document, then utilize the Excel document as a Power Pivot data source.
2. Copy the information to the clipboard, then paste it into Power Pivot.

Assume you have the following data in a word document:

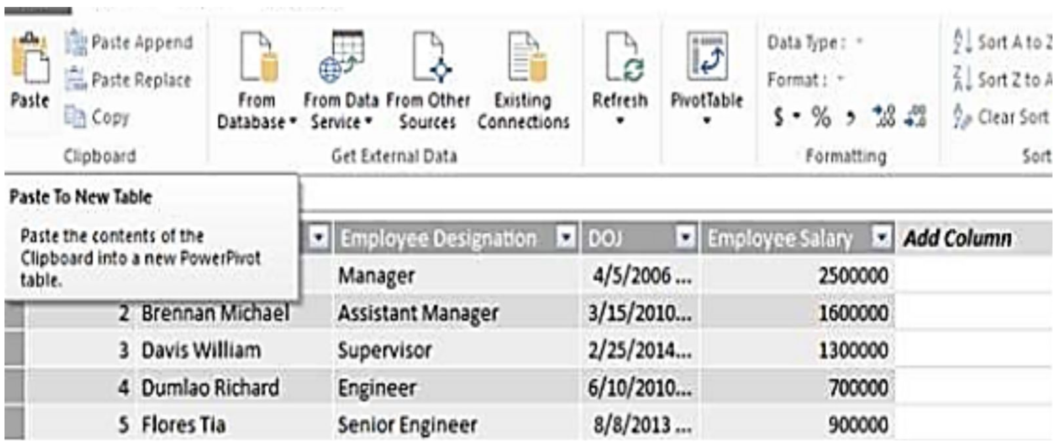
Employee Data of the Project XXX				
S. No.	**Employee Name**	**Employee Designation**	**DOJ**	**Employee Salary**
1	Albertson Kathy	Manager	4/5/2006	2500000
2	Brennan Michael	Assistant Manager	3/15/2010	1600000
3	Davis William	Supervisor	2/25/2014	1300000
4	Dumlao Richard	Engineer	6/10/2010	700000
5	Flores Tia	Senior Engineer	8/8/2013	900000

Data compiled by - Walters, Chris.
Data compiled on - 4/1/2016.

Power Pivot does not support Word as a data source. As a result, do the following:

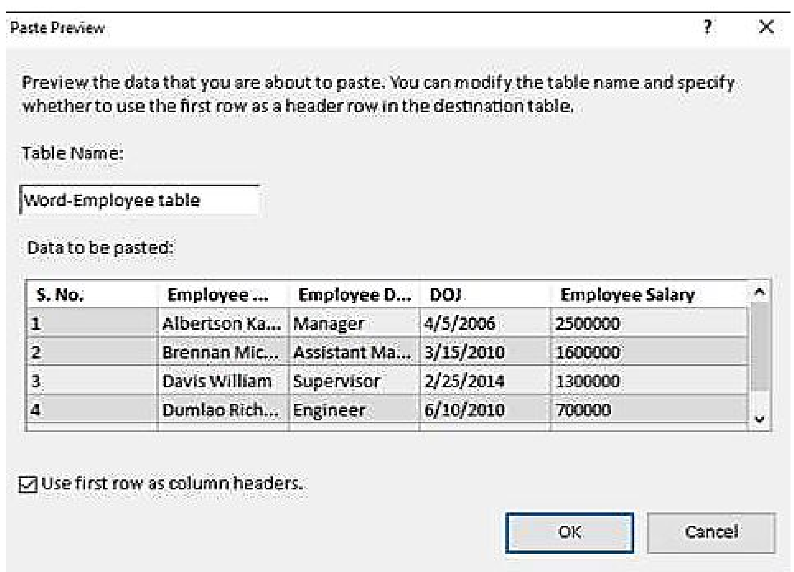
- In the Word document, choose the table.

- Copy it and it should be pasted into the PowerPivot window.



A dialog window called Paste Preview displays.

- Assign the table the name Word-Employee.
- Select the checkbox. Click OK to use the first row as column headings.

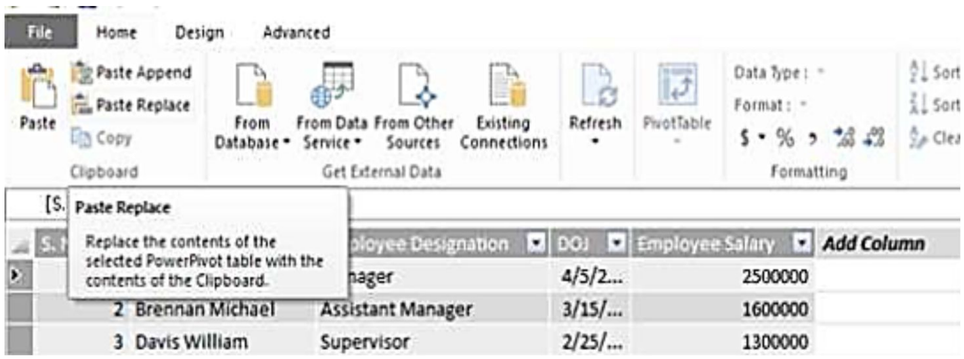


With the tab Word-Employee table, the data copied to the clipboard will be transferred into a new data table in Power Pivot.

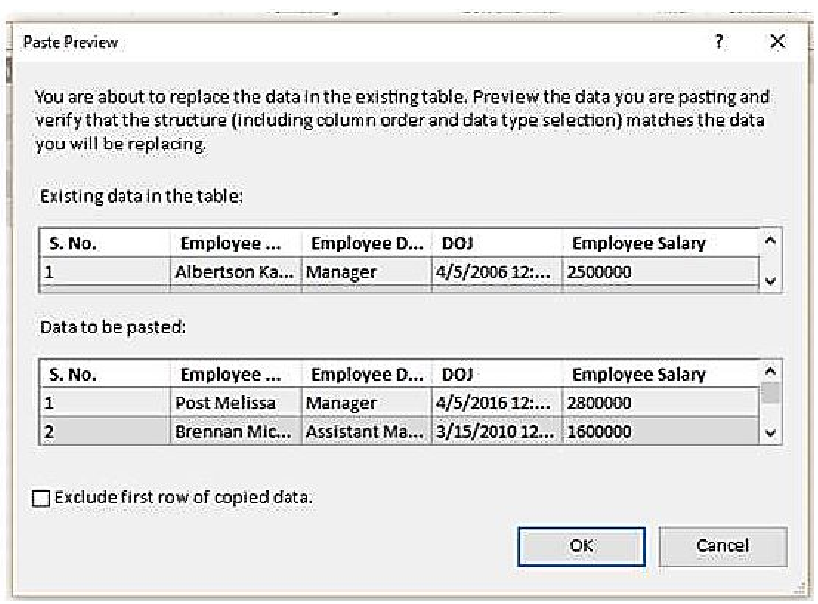
S. No.	Employee Name	Employee Designation	DOJ	Employee Salary	Add
1	Albertson Kathy	Manager	4/5/2...	2500000	
2	Brennan Michael	Assistant Manager	3/15/...	1600000	
3	Davis William	Supervisor	2/25/...	1300000	
4	Dumlao Richard	Engineer	6/10/...	700000	
5	Flores Tia	Senior Engineer	8/8/2...	900000	

Let's say you wish to change the information in this table with something fresh.

- Make a copy of the table in Word.
- Select Paste Replace from the menu.



A dialog window called Paste Preview displays. Make sure the items you're utilizing for replacement are correct.

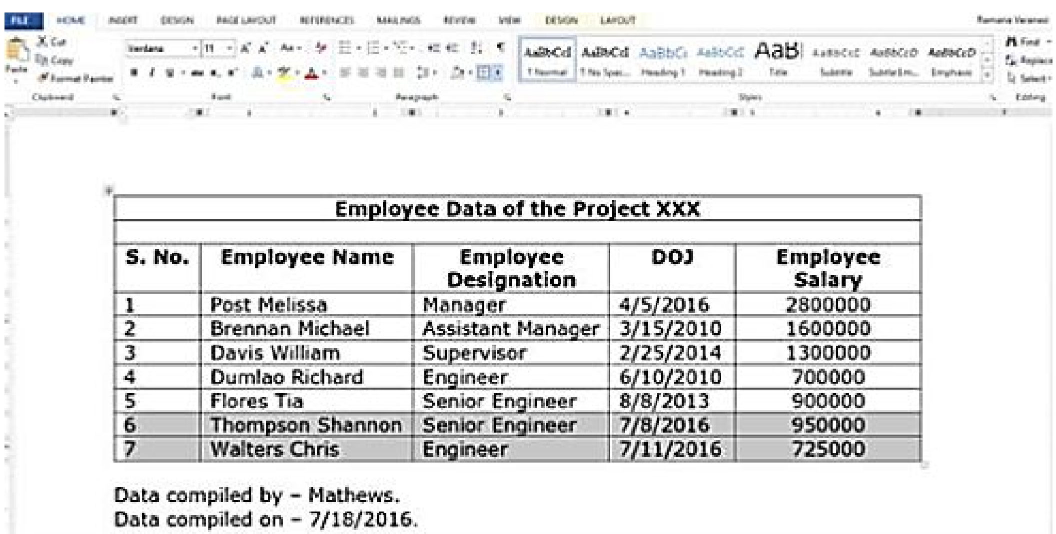


Click the OK button.

S. No.	Employee Name	Employee Designation	DOJ	Employee Salary
1	Post Melissa	Manager	4/5/2016 ...	2800000
2	Brennan Michael	Assistant Manager	3/15/201...	1600000
3	Davis William	Supervisor	2/25/201...	1300000
4	Dumlao Richard	Engineer	6/10/201...	700000
5	Flores Tia	Senior Engineer	8/8/2013 ...	900000

The values of the data table in Power Pivot are substituted by the values of the clipboard, as you can see.

Let's say you wish to add two additional data rows to a data table. The two news rows are in the table of the Word document.

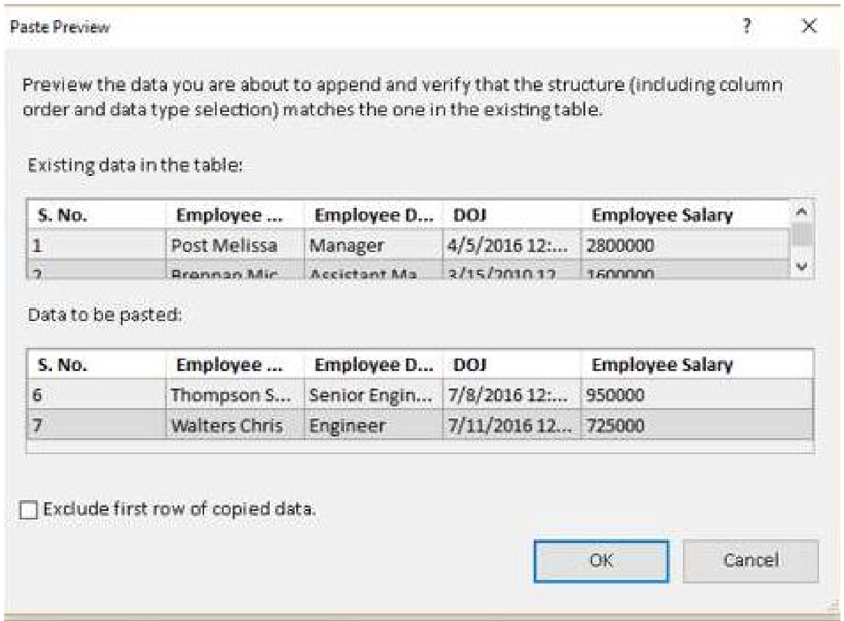


Employee Data of the Project XXX

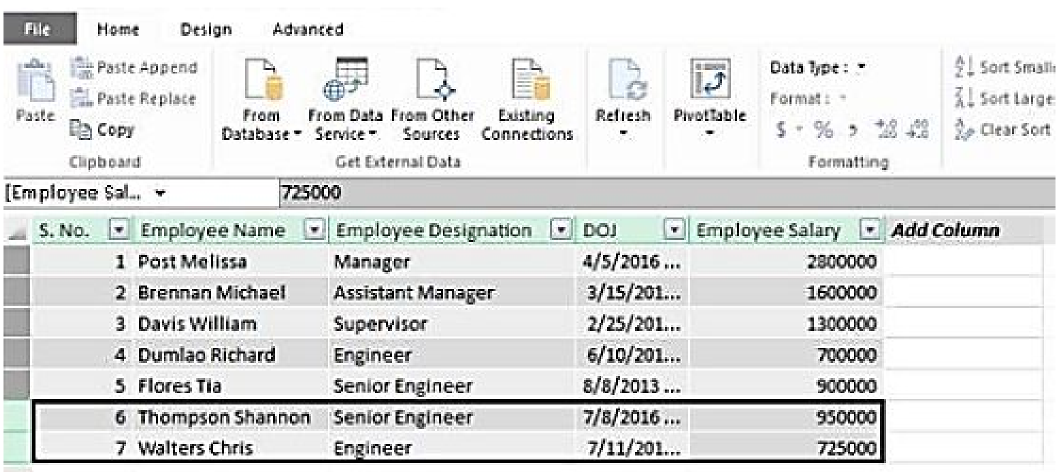
S. No.	Employee Name	Employee Designation	DOJ	Employee Salary
1	Post Melissa	Manager	4/5/2016	2800000
2	Brennan Michael	Assistant Manager	3/15/2010	1600000
3	Davis William	Supervisor	2/25/2014	1300000
4	Dumlao Richard	Engineer	6/10/2010	700000
5	Flores Tia	Senior Engineer	8/8/2013	900000
6	Thompson Shannon	Senior Engineer	7/8/2016	950000
7	Walters Chris	Engineer	7/11/2016	725000

Data compiled by – Mathews.
Data compiled on – 7/18/2016.

- The two new rows should be selected.
- Select Copy.
- In the Power Pivot window, choose Paste Append. A dialog window called Paste Preview displays.
- Make sure the material you're using to attach is correct.



To continue, click **OK**.



The contents of the data table in Power Pivot are concatenated with the contents of the clipboard, as you can see. Transferring data to an excel file and utilizing linked tables is preferable to copying from the clipboard.

This is due to the following factors:

1. When you utilize a linked table, you can see where the data came from. On the other side, you won't know the data's source or whether it's utilized by someone else afterward.
2. The Word file contains tracking information, such as when data is changed and when data is inserted. There is, however, no method to

replicate the data into Power Pivot. You may save the information for later use if you copy the data to an excel file first.

3. If you wish to make some remarks when copying from the clipboard, you won't be able to do so. You may add comments to your Excel table that will be connected to the Power Pivot if you copy them to an Excel file first.

4. The content taken from the clipboard cannot be refreshed. If the data comes from a corresponding table, you can always make sure it's current.

Refreshing and managing external data connections

This is more like updating your power pivot. At any moment, you may update the data imported from external data sources. You may refresh the data for the PivotTables in your worksheet at any moment by clicking Refresh. PivotTables linked to external data, such as a database (SQL Server, Oracle, Access, or other), an Analysis Services cube, a data stream, and many more sources, may have their data refreshed. In the same or a separate spreadsheet, you may also refresh data from a source table. You may also configure your worksheet to automatically update its PivotTable data whenever you open it.

PivotTables are not automatically refreshed by default, but you might also specify that they are refreshed whenever you open the worksheet that includes the PivotTable.

If you simply wish to update one data table in Power Pivot, follow these steps:

- Select the data table's tab.
- Refresh the page by clicking the button.
- From the dropdown menu, choose Refresh.

If you wish to update all of the Power Pivot data tables, perform the following:

- Refresh the page by using the Refresh button.
- From the dropdown menu, choose Refresh All.

Manually refreshing your Power Pivot data

To bring up the PivotTable Tools on the ribbon, click anywhere in the PivotTable.

- Press Alt+F5 or select Analyze, then Refresh.

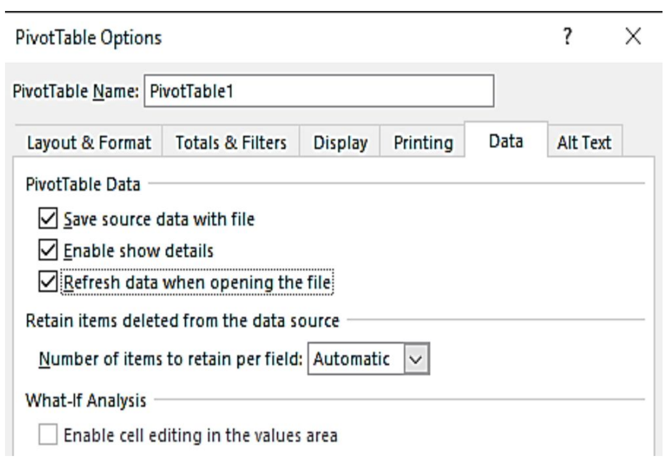
Hint: Pick Analyze > Refresh All to update all PivotTables in your worksheet in one go.

Whenever refreshing takes much longer, verify the refresh progress by going to Analyze, then, select Refresh arrow, and choose Refresh Status.

- Tap Cancel Refresh to halt the refresh.

Setting up automatic refreshing

On the Pivot Table ribbon, click Analyze. Click on Options. Then, select the Data tab and check the box on the Refresh data when opening the file option.



Select Ok.

Editing your data connection

If you wish to update a table's connection, navigate to PowerPivot's "Design" ribbon, pick "Existing Connections," then "PowerPivot Data Connections," which will show you all of your previous connections. Hit "Edit" after selecting the connection you wish to change. By selecting "Refresh" in the "Existing Connections" pane, you may reload all the tables from the now-changed connection.

CONCLUSION

I have just discussed all the Power Pivot. Power Pivot is very helpful in carrying out some tasks. With the samples we used in this chapter in creating relationships, loading data from different sources, linking Excel tables, managing relationships, and lots more, you can utilize them to carry out your task on Power Pivot.

CHAPTER TWO

WORKING DIRECTLY WITH THE INTERNAL DATA MODEL

This chapter describes how to interact directly with the underlying data model without using the Power Pivot Ribbon interface by using a mix of PivotTables and Excel data connectors. The associations between both tables may have to be adjusted if a user adds tables to the internal data model.

The Manage Relationships dialog box must be activated before changes to relationships in an internal data model may be made. To delete a table or data source from the internal data model, the operator must activate the Data tab on the Ribbon and then select the Queries & Connections command.

Managing Relationships in the Internet Data Model

Power Pivot's main feature is its ability to handle data tables and connections between them, making it easier to analyze data from multiple tables. While constructing a PivotTable, or straight from the PowerPivot Ribbon, you may add an excel table to the Data Model.

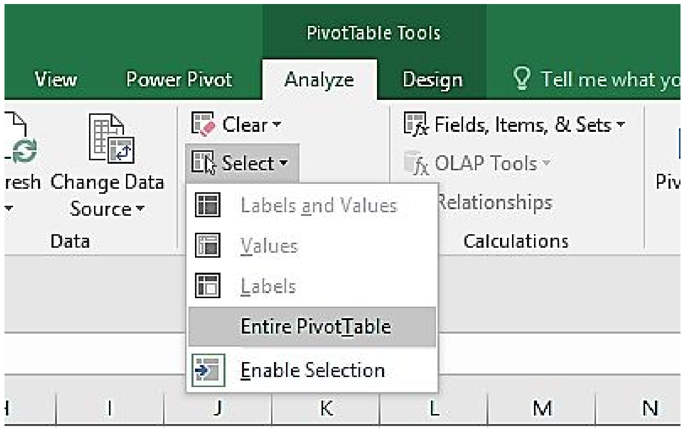
Only when there are linkages between tables can you evaluate data from various tables. You may construct relationships in Power Pivot using the Data View or Diagram View. Furthermore, if you opted to include a table in the Power Pivot, you must also include a relationship.

Removing a Table from the Internal Data Model

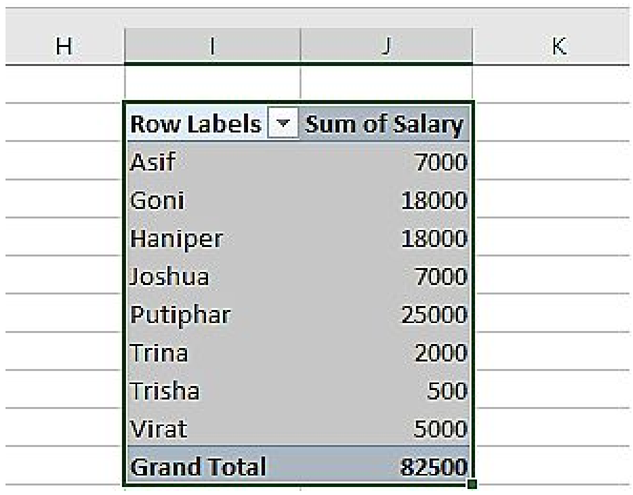
Let's suppose you've previously generated a pivot table from a dataset. You've also created a report using that pivot table. You now wish to remove the pivot table while keeping the rest of the report. To do so, follow the below instructions:

Click on the Analyze tab. This tab will only display when you click or select a cell in the pivot table report.

Click on **Select**. Pick **Entire Pivot Table.**



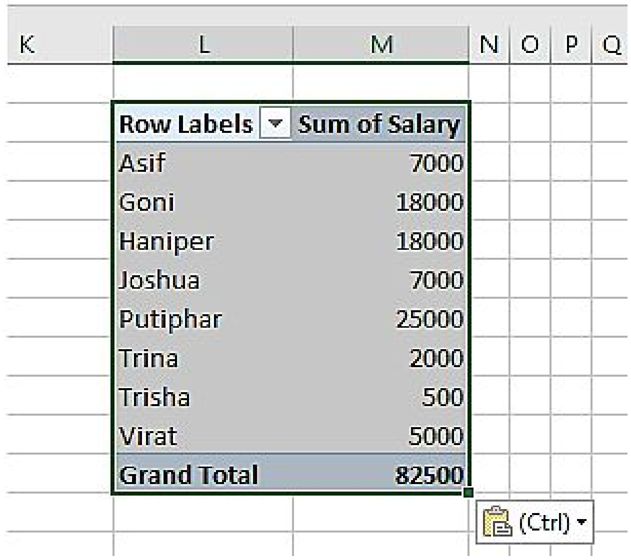
This will select the entire pivot table.



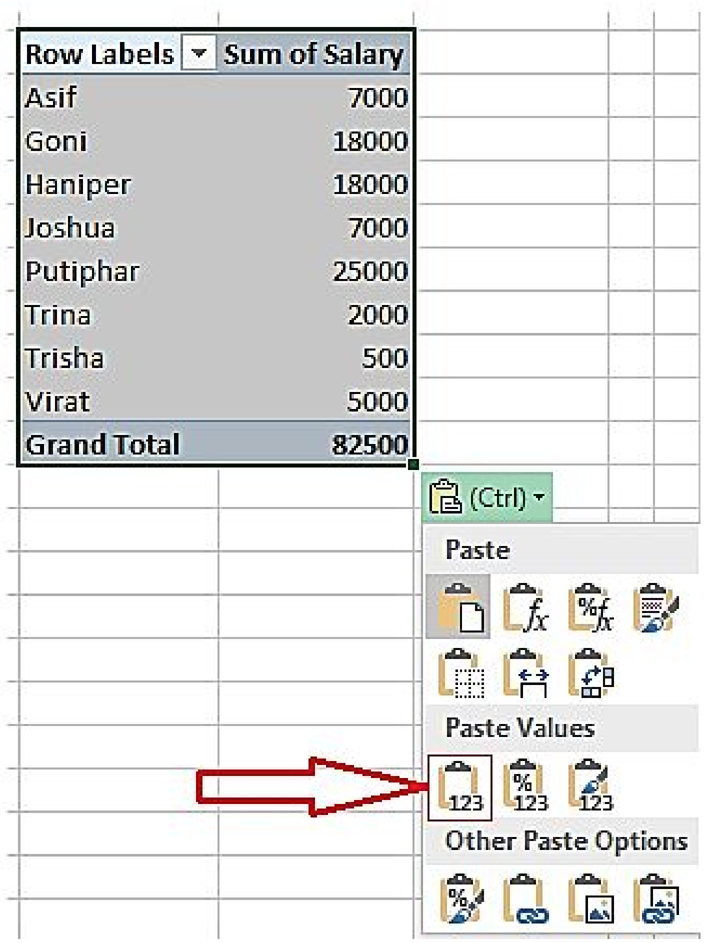
Press Control key + C to copy the table.

Choose a cell in the same worksheet. You can select another worksheet if you want to.

Press Control key + V to paste.



Click on the Control Key dropdown symbol. Click on the Paste Values option there.



The first step above was for saving the file in another location so as to keep it safe in case of any mistakes.

Now, let’s delete the pivot table.

Manually select the pivot table. Then, press the Delete key on your keyboard. You can also select Clear All on the Home tab.

Without losing data, there is no straightforward method to remove the pivot table. This is the simplest method for deleting a pivot table while keeping all of its data.

CONCLUSION

In this chapter, I have explained the steps in managing relationships and removing a table from the Internal Data Model in Power Pivot. Making connections between tables it’s really important. It helps you to understand more about the tables you are working on. So, ensure you utilize the steps and instructions given here when dealing with your Internal Data Model.

CHAPTER THREE

ADDING FORMULAS TO POWER PIVOT

Data analysis expressions, or DAX functions, are a powerful collection of functions in Power Pivot that enable users to execute arithmetic computations, recursive computations, data lookups, and much more. This chapter exposes users to DAX functions and lays out the groundwork for creating their own Power Pivot data models computations. Calculated columns are columns that users construct to add their own formulae to a Power Pivot table.

Building formulae in an Excel table is similar to generating a calculated column. DAX is the mathematical language that Power Pivot utilizes to do computations inside its own table and column structure. The functions that come with the DAX formula language are unique. A few of the DAX functions that may be used in calculated columns are discussed in this chapter. Cube functions are Excel functions that allow you to retrieve data from a Power Pivot data model without having to utilize a Pivot Table.

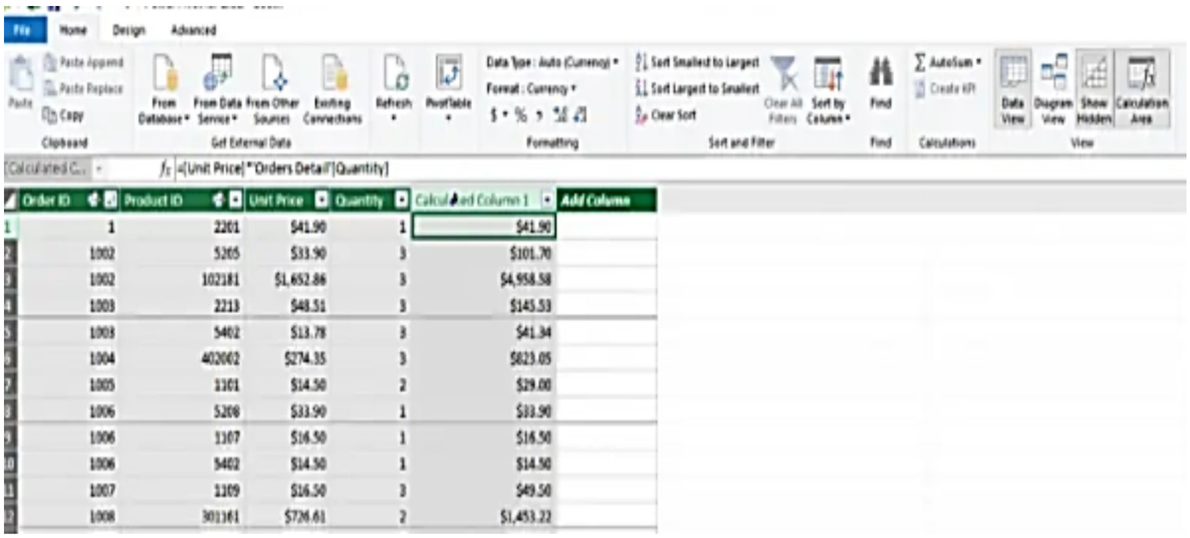
Enhancing Power Pivot Data with Calculated Columns

Creating your first calculated column

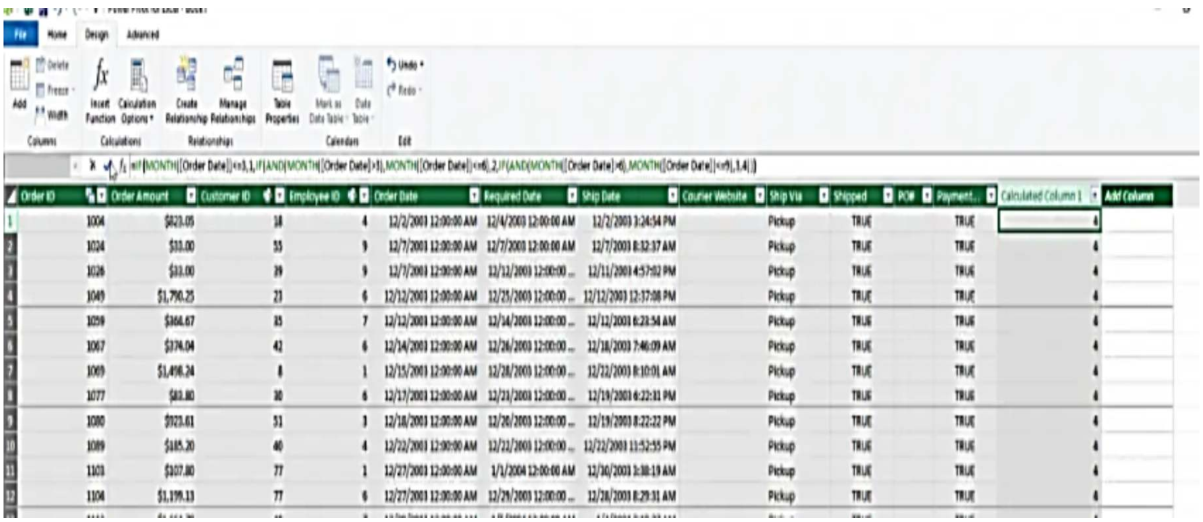
The tables in the Power Pivot data model may be used to produce computed columns and measurements. This allows you to generate table data for use in PivotTables and Pivot Charts. It is one of the main advantages of the Power Pivot add-in over Excel's regular PivotTables.

The Power Pivot data model has a number of formulae that allow you to compute values for current table columns. Such formulas are not necessarily identical to the conventional Excel workbook formulas. DAX formulas are the name for these formulae. To compute numbers, they can employ somewhat diverse functions and syntax than standard Excel functions. The syntaxes, though, are fairly identical. The DAX formula for calculated columns and fields may be created using Excel's aid. You won't have to bother more about the syntax of the formulae you make this way.

To construct a column value, you use Power Pivot to generate calculated columns inside a table in the data model window. In the "Values" area of the PivotChart or PivotTable, you may summarize that value. For instance, if an "Order Details" table included both a "Quantity" and "Unit Price" field, you might construct an additional calculated column called "Order Total" that presents the outcomes of the combination of these two columns. To get the sum of order totals for a specific grouping, you might add this column to the "Values" portion of a PivotChart or PivotTable.



Conversely, you may utilize Power Pivot in Excel to construct calculated columns to produce a new column to use in the "Row" or "Columns" portions of a Pivot Table or PivotChart. For instance, if you have an "Order Date" field in a "Orders" table and need to arrange outcomes by the quarter wherein the order was made, you might build a calculated column in the database that shows the quarter for every related "Order Date" value. You might then arrange by the values of this new computed column in the appropriate portion of a PivotChart or PivotTable.



To add a calculated column to a table in a Power Pivot data model, open the data model window and choose the table tab. Furthermore, at the far right end of the table, tap onto the highest cell in the "Add Column" column. Now, in the cell, type the formula for the column to compute.

The formula displays in the Formula Bar for formulae that you type in by yourself. Begin by inputting the equal sign, then the field names wrapped in parentheses, and then the typical mathematical operations to connect them together then. To add a field link to the formula you input, you may simply press the field names of the fields in the table. To verify the formula, use the "Enter" key on your computer or select the checkmark icon in the Formula Bar.

By tapping the "Design" tab in the Ribbon of the data model's window, you may also generate a formula that employs a function. To enter the "Insert Function" dialog box, click the "Insert Function" icon in the "Calculations" tab group. The functions you may enter are listed in this chat window. This list allows you to choose a function.

The function and any extra parameters are shown at the bottom of the dialog box as a result of this action. To put a function into the Formula Bar, first, choose one and then hit the "OK" icon. Next, in the Formula Bar, finish inputting the function's extra parameters. To verify the formula, use the "Enter" key on your computer or click the checkmark icon in the Formula Bar.

Formatting your calculated columns

There are different ways you can format the calculated columns that you have created. Below are some of the ways that you can do so.

Giving names to Calculated Columns

New calculated columns are placed at the right of existing columns by default, and the column is given the names CalculatedColumn1, CalculatedColumn2, and so forth.

You may reorganize and rename columns once they've been created.

1. Changes to computed columns are subject to the following restrictions:
2. Within a table, each column name should be unique.
3. Avoid using names for metrics that have previously been utilized in a similar worksheet. However, it is feasible for a measure and a computed column to get the same name, but calculation mistakes may easily occur if names are not unique.
4. When referencing a column, do use a professionally competent column reference to prevent mistakenly executing a measure.
5. You must therefore change any calculations that depend on the current column when renaming a computed column. Unless you're manually updating settings, formula results are updated automatically. This procedure, however, may take some time.
6. In Power Pivot, there are several elements that can't be included in the column names or the names of many other objects.

To rename or change the name of an existing computed column, follow these steps:

1. Right-click the header of the computed column you wish to rename in the Power Pivot panel and choose Rename Column.
2. To approve the new name, input a new name and then hit ENTER.

Changing the Type of Data

A computed column's data type may be changed in the same manner that other columns' data types can be changed. The following data-type conversions are not possible: text to decimal, text to integer, text to currency, and text to date. You have the option of switching from text to Binary.

Hiding calculated columns from end-users

You may conceal whole tables or specific columns in a data model for a Power View or PivotTable report such that only pertinent things are displayed in the field list. This is especially helpful if you have duplicate tables or columns. You may not want the Product Category table to appear in the fields list if you add "Product Category Name" to the Products table.

Calculated fields may also be hidden. You may, for instance, conceal intermediate computations from the fields list if you have sophisticated computations that contain additional calculations you don't want to disclose.

1. To conceal an entire table, right-click the tab containing the table and select Hide from Client Tools.
2. To conceal specific columns, open the table where you want to hide them, right-click the column, and choose Hide from Client Tools. By pressing and holding the Control or Shift keys, you may conceal numerous columns at once.
3. Ensure the computation area is displayed before right-clicking the field and selecting Hide from Client Tools.

The column will be effectively wiped out to indicate that it is unavailable to reporting users who use the model. Hidden columns in the model are effectively wiped out to show their status, but they remain available in the Data View so you may interact with them.

A column's concealing doesn't really make it disappear from the model. In a table, a concealed column may still be utilized as a sort column. It may also be used to specify calculated columns or calculated fields in a formula. The option to conceal columns is meant to clarify and reduce the list of columns displayed to reports that need them, not for data protection.

UTILIZING DAX TO CREATE CALCULATED COLUMNS

Identifying DAX functions safe for calculated columns

Data Analysis Expressions (DAX) may seem scary at first, but don't be fooled by the word. The fundamentals of DAX are actually pretty simple to grasp. To begin, keep in mind that DAX is not a programming language. A formula language is DAX. Custom computations for Calculated Columns and Measures may be defined using DAX (also called calculated fields). Some of the capabilities included in Excel formulae are included in DAX, as well as extra functions for working with relational data and performing dynamic aggregation.

DAX Formulas: What You Need to Know

Formulae in DAX are fairly similar to formulas in Excel. You enter an equal sign, then a function name or expression, and any needed values or parameters to construct one. DAX, like Excel, has a number of functions for working with strings, doing computations with timelines, and creating conditional values.

DAX formulae, on the other hand, vary in the following significant ways:

1. If you wish to personalize calculations row by row, DAX has methods that enable you to utilize the current row value or a linked value to conduct computations that change depending on the context.

2. A function in DAX that produces a table instead of a single value is called a table function. These routines may be used to feed data into other programs.

3. In DAX, Time Intelligence Functions enable you to do computations utilizing date ranges and analyze the outcomes over many periods.

Building DAX-driven calculated columns

Constructing a calculated column in Power Pivot allows you to add new data to a table. As with any other column, the new column may be utilized in PivotTables, Pivot Charts, and reports. You must insert a DAX formula in calculated columns. In a Finance table, for instance, the formula = [Earnings] + [Bonus] might be used to generate a new Total Pay column. For every row, this increases values from the same table's Earnings column to the Bonus column's values.

Calculated Columns in Power Pivot is a good place to start to learn more.

1. Scroll to and select the right-most column in the table where the new column will be added.
2. Enter a valid DAX formula into the formula bar and hit Enter.
3. Right-click the column heading and choose Rename, then enter a new name.

You can't enter a name within the formula itself, unlike with Calculated fields.

Month sorting in Power Pivot-driven Pivot Tables

The sort by columns function in PowerPivot is among the additional features. It enables you to sort one column by another (for example, weekdays names) (e.g. weekday number). This may be handy for sorting month names, for instance.

Normally, when your months of the year are arranged from January to December, but when you decide to sort them alphabetically, it will display as;

- April
- August
- December
- February
- January
- July
- June

- March
- May
- November
- October
- September

Basically, this is how your months are sorted in a power pivot. If you want it to be in the normal way, simply follow the steps below;

- Click on the Sort button on the Home Tab. Select Sort by Column.
- On the box that appears, input the columns that you want to sort.
- Press Ok.

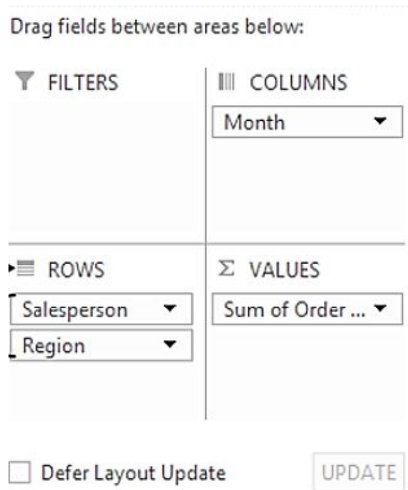
Nesting functions

If some of the PivotTable areas have greater than a field, the PivotTable layout is determined by the order in which the fields are placed in that area. The Nesting Order is the term for this.

You may set the fields in the necessary order provided you understand how your data is formatted. If you're not certain how the data is structured, you may rearrange the fields in the PivotTable to modify the layout instantaneously.

Fields in Nesting Order

Given the below instance of sales data, in which the fields are arranged in the correct sequence:



Here, there are two fields in the rows area: salesperson and region, within this order. Nesting order refers to the order in which the fields appear, such as Salesperson first and Region second.

The variables in the rows in the PivotTable will be shown in this order, as shown below.

Sum of Order Amount	Column Labels			
Row Labels	January	February	March	Grand Total
Albertson, Kathy	**925**	**1375**	**350**	**2650**
East	925	1375	350	2650
Brennan, Michael	**2750**	**550**	**400**	**3700**
West	2750	550	400	3700
Davis, William	**1100**	**235**	**600**	**1935**
South	1100	235	600	1935
Dumlao, Richard	**400**	**965**	**125**	**1490**
West	400	965	125	1490
Flores, Tia	**1655**	**985**	**1925**	**4565**
South	1655	985	1925	4565
Post, Melissa	**765**	**575**	**350**	**1690**
East	765	575	350	1690
Thompson, Shannon	**1140**	**1720**	**300**	**3160**
North	1140	1720	300	3160
Walters, Chris	**355**	**2755**	**1265**	**4375**
South	355	2755	1265	4375
Grand Total	**9090**	**9160**	**5315**	**23565**

As you can see, the contents of the second field are nested underneath the contents of the first field in the nesting sequence.

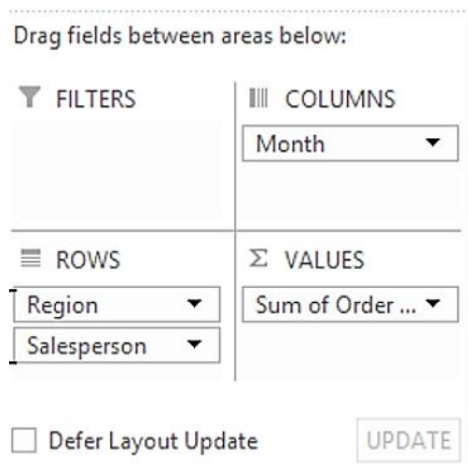
Each salesperson is related to just one area in your data, although the majority of the regions are connected with many salespeople. As a result, it's possible that reversing the nesting order will make your PivotTable more relevant.

Changing the Order of Nesting

Simply select the field and drag it to the desired location to modify the nesting order of the fields in a section.

Drag the field Salesperson to the right of the field Region in the ROWS area.

As a result, you've modified the nesting order to Region first, Salesperson second, as seen below:



The PivotTable that results will look like this:

Sum of Order Amount	Column Labels			
Row Labels	January	February	March	Grand Total
East	**1690**	**1950**	**700**	**4340**
Albertson, Kathy	925	1375	350	2650
Post, Melissa	765	575	350	1690
North	**1140**	**1720**	**300**	**3160**
Thompson, Shannon	1140	1720	300	3160
South	**3110**	**3975**	**3790**	**10875**
Davis, William	1100	235	600	1935
Flores, Tia	1655	985	1925	4565
Walters, Chris	355	2755	1265	4375
West	**3150**	**1515**	**525**	**5190**
Brennan, Michael	2750	550	400	3700
Dumlao, Richard	400	965	125	1490
Grand Total	**9090**	**9160**	**5315**	**23565**

You can see that the layout with the nesting order Region and then Salesperson produces a more concise and useful report than that of the layout with the nesting order Salesperson and then Region.

The prior Layout would've been a better alternative if a Salesperson handles more than one region and you will need to summarize sales per Salesperson.

Understanding calculated measures

A measure is a calculation written expressly for use in a Powerpivot PivotTable (or PivotChart) using PowerPivot data. Measures may be created using common aggregation methods like COUNT or SUM, or you can use DAX to create your own formula. In the Values section of a PivotTable, a measure is utilized. Utilize a calculated column instead of a calculated row if you wish to put calculated results in a separate region of a PivotTable

Hardly anything occurs when you create a formula for just an explicit measure unless you attach the measure to a PivotTable. The formula is tested for every cell in the Values section of the Pivot Table when you insert the measure. Because when a result is generated for every conjunction of row and column headings, the measure's outcome in each cell may change. You connect a measure with a table in the workbook when you create it, and the measure description is preserved with this table.

The way you utilize measures in a PivotTable or PivotChart, as well as other programs that utilize a Power Pivot Data Model as a data source, depends on whether they're implicit or explicit.

Calculated Field Implicit

Whenever you move a field, like Sales Amount, to the VALUES section of the PivotTable Fields list, Excel creates an implicit measure. Since Excel creates implicit measures, you may be unaware that a fresh measure has been produced. However, if you look carefully at the VALUES list, you'll notice that the Sales Amount column is really a measure called Sum of Sales Amount, which displays in the VALUES section of the PivotTable Fields list as well as on the PivotTable itself.

Implicit measurements must utilize the data format stated for that aggregate and can only employ a basic statistic (SUM, COUNT, MIN, MAX, DISTINCTCOUNT, or AVG). Furthermore, implicit measurements may only be utilized by the PivotTable or graphic that they were built for.

An implicit measure is inextricably linked to the field on which it is built, which has implications for how you remove or amend the measure in the future.

Calculated Field Explicit

Whenever you input or choose formula in a cell in the Calculation Area, or when you use the AutoSum function in the Power Pivot window, you generate an explicit measure. The majority of the metrics you define will be clear.

Any PivotTable or PivotChart in the worksheet, as well as Power View reports, may utilize explicit measurements. They may also be expanded to make a KPI or structured using one of the several numeric data strings available. When you use an explicit calculated field, context menu actions for Create KPI and Format are only accessible.

Note that once you've used a measure as a KPI, you can't use it again; you'll need to generate a duplicate if you wish to use the formula in additional calculations.

For Instance;

Adventure Works' sales manager has indeed been requested to offer resellers sales predictions for the coming fiscal year. She chooses to base her projections on sales from the previous year, with a 6% yearly rise due to numerous promotions planned for the following six months.

She uploads previous year's resellers' sales data and inserts a PivotTable to create the estimates. She locates the Sales Amount column in the Reseller Sales table and drags it to the PivotTable Fields list's VALUES section. The column shows a single value in the PivotTable, and it represents the total of all reseller sales from the previous year. She notes that, despite the fact that she did not express the calculation herself, one has been given immediately, and the column in the field list and on the PivotTable has been changed to Sum of Sales Amount. **=SUM('FactResellerSales'[SalesAmount]),** an Excel built-in aggregate, does the calculation. She changes the name of the implicit metric Last Year Sales.

The sales prediction for the following year would be predicated on last year's sales multiplied by 1.06 to account for the predicted 6% rise in reseller trade. She must build the measure directly for this calculation, using the New Calculated Field option to make a calculation called Projected Sales. **=SUM('FactResellerSales'[SalesAmount])*1.06** is the formula she writes in.

In the PivotTable Fields list, the new measure is placed in the VALUES section. It's also described in the table in the PivotTable Fields list that's now active. In the workbook, the table serves as a home for the measure. She modifies the measure to modify its table connection since she wishes it to be in a separate table.

The sales manager gets the fundamental information in place fast and with little work on her side. She may now refine her forecasts by focusing on individual resellers or incorporating product portfolio information to ensure that future offers are for items carried by the reseller.

Editing and deleting calculated measures

Naming a Measure

After you've generated a measure, you may rearrange and rename it.

Modifications to measurements are, nevertheless, subject to the following limitations:

1. Measures, like other objects, are shown in the PivotTable Fields list unless they have been hidden. Contemplate naming them in a manner that makes the activity they'll execute obviously.
2. Inside a table, every measure title should be distinctive.
3. In a current worksheet, try avoiding names that have previously been utilized for computed columns. However, it is feasible for a measure

and a computed column to have the same name, calculation mistakes might occur if names are not unique.

4. Whenever you rename a measure, all formulae that use it should be changed as well. The results of formulae are automatically updated unless you are in manual update mode. This procedure, however, may take some time.
5. There are certain characters that cannot be used in the name since it is part of the measure's formula.

Make a Change to an Existing Measure

The PowerPivot Field List displays a list of all tables in the present PowerPivot panel, encompassing raw data columns, calculated columns, and any custom measures you've created. You may launch a context menu that enables you to see and alter the measure definition by right-clicking on the definition of any measure and selecting the Edit formula.

To see and modify an existing measure, follow the steps below;

1. Find the table that includes the measure you established in the PowerPivot Field List.
2. Base columns, computed columns, and measurements may all be found in a table. A little calculator icon appears to the right of the measure name to denote the measure.
3. Select Edit Formula from the context menu by right-clicking.
4. Edit the formula in the Measure Settings chat window.
5. You may also edit the measure or customer's name, as well as the table connected with it.

Using Cube Functions to Free your data

Introduction to cube using

The data in Power Pivot's Data Model is hidden from the view in the spreadsheet. That implies there are really no cells on the worksheet that can be referenced by traditional Excel formulas. As a result, typical Excel formulae will not be able to obtain data from the Data Model. Cube Functions, on the other hand, are Excel formulae that enable users to extract data from specific sources. In Power Pivot, Cube functions may communicate with the Data Model.

"Well, I've spent all of my time studying DAX to make calculations on the Data Model," you could remark now. "How do Cube functions get data from the Data Model in the Excel Worksheet?" you may wonder.

There's no reason to be concerned. In reality, DAX (measures) and Cube functions have a wonderful relationship. To do calculations on your dataset, you'll need to use the DAX language. The concept of a measure is kept as a component of the Data Model in a so-called Measure.

Cube functions, on the other hand, refer to components of the data cube and retrieve values from it. Among the elements that cube functions may reference is a measure specified in DAX. Cube formulae may be thought of as a link between both the Data Model and the Excel Worksheet. The Excel user obtains entry to the Data Model data via this gateway. The DAX formula language will never be replaced by cube functions. Rather, they rely on the DAX-defined metrics.

Using the cube function

Utilizing a Pivot Table with the Data Model as the Data Source is the simplest method to get started with Cube functions.

Setup of Data

Assume you have the dataset below.

Date	Year	Week of Year	Day Name
01/01/2018	2018	1	Monday
02/01/2018	2018	1	Tuesday
03/01/2018	2018	1	Wednesday
04/01/2018	2018	1	Thursday
05/01/2018	2018	1	Friday
06/01/2018	2018	1	Saturday
07/01/2018	2018	1	Sunday
08/01/2018	2018	2	Monday
09/01/2018	2018	2	Tuesday
10/01/2018	2018	2	Wednesday
11/01/2018	2018	2	Thursday
12/01/2018	2018	2	Friday
13/01/2018	2018	2	Saturday
14/01/2018	2018	2	Sunday

Seller	Sex
Diana	Female
Jamie	Female
Michelle	Female
Lisa	Female
Mark	Male
Richard	Male
Dennis	Male

Date	Product	Seller	Sales
10/04/2018	Face Cream	Diana	63,71
19/04/2018	Face Cream	Jamie	90,07
16/04/2018	Face Cream	Michelle	143,95
01/04/2018	Face Cream	Lisa	156,06
16/04/2018	Hand Soap	Mark	59,3
15/04/2018	Hand Soap	Jamie	65,06
22/04/2018	Hand Soap	Lisa	74,05
06/04/2018	Hand Soap	Diana	86,08
24/04/2018	Sun Lotion	Richard	303,02
15/04/2018	Sun Lotion	Lisa	347,1
23/04/2018	Sun Lotion	Dennis	371,04
16/04/2018	Sun Lotion	Mark	385,98

A Product Sales table, which is linked to a Gender table and a Calendar table, may be found. Excel's Data Model includes the tables. The tables of the Data Model are linked together as shown below.

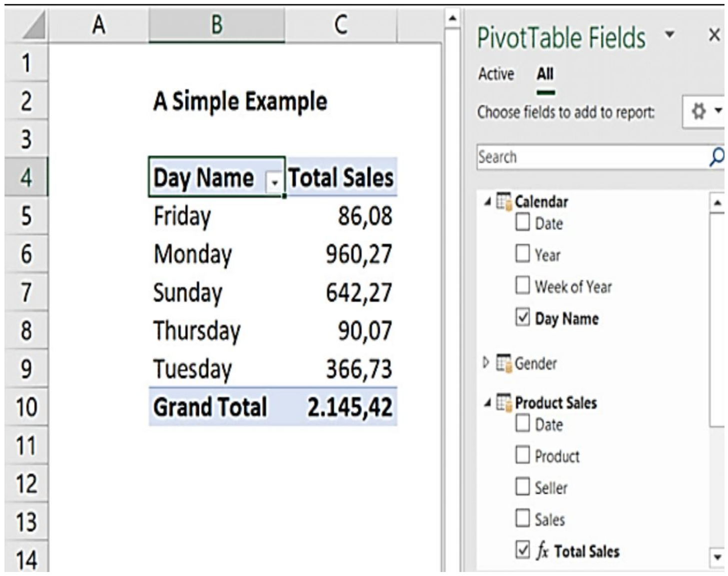
A measure using the DAX formula may be found in the table Product Sales.

SUM('Product Sales'[Sales]) = Total Sales

By using a Data Model, construct a PivotTable.

After you've set up the data, you can create a pivot that displays Total Sales per Day Name of the Week.

1. Select Insert -> Pivot Table from the drop-down menu.
2. Use the Data Model in this Workbook -> OK
3. Insert Day Name to the rows, and Total Sales as a Variable to the measure.



Notice how the Data Model is used in the above Pivot. A Table Icon with a yellow database icon in the bottom right corner precedes the utilized tables (presented in bold text). The table is a component of PowerPivot's Data Model, as shown by the yellow sign.

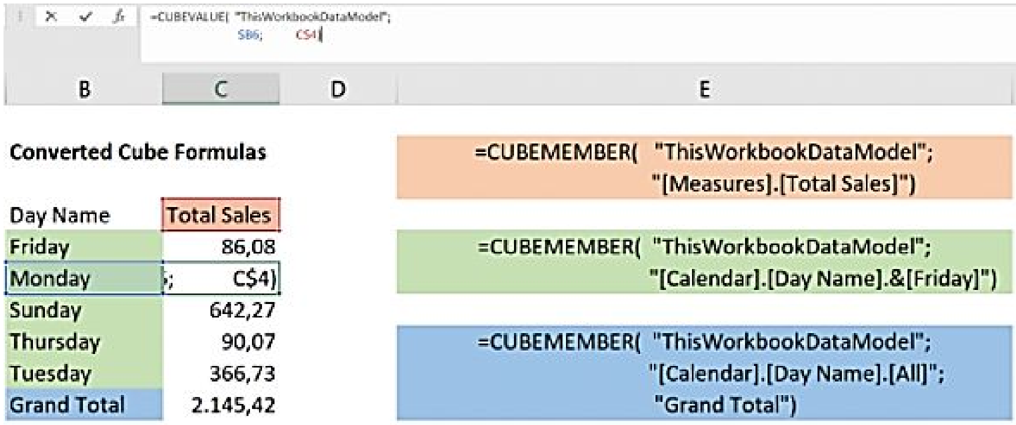
Formula Conversion

The Total Sales are classified by Day Name in the Pivot Table. This configuration hasn't done anything spectacular thus far. However, we may convert the shown data to Cube formulae from here.

So, how do you convert Pivot Table formula to Cube formulas?

4. Check to see whether your cursor is within the Pivot Table.
5. Select Analyze from the contextual tabs. (Note that this tab displays only while the cursor is inside the Pivot Table.)
6. Select Convert to Formulas from the OLAP Tools menu.

From a Pivot Table to a Cube Formulas, the shown values in the Pivot Table transform. The result is the same.



Study the formulae for a moment. The formulae in the colored cells on the right are comparable to those in the colored cells on the left. CUBEMEMBER() and CUBEVALUE() are two new cube functions ().

- A CUBEMEMBER formula in the orange indicated cell has a cell reference to the DAX Measure named Total Sales.
- The CUBEMEMBER formula in the green indicated cells relate to a single member of the data model. The column Day Name from the Calendar table was filtered on Friday in this example.
- The blue indicated cell has a CUBEMEMBER formula that also refers to the Calendar table's Day Name field. However, instead of filtering a particular day, it refers to all of the data.
- The numbers are CUBEVALUE formula that relate to two CUBEMEMBER formulas in this case. The CUBEVALUE formula is the same for all of the values. It always refers to the Total Sales Measure as well as the cube member to the left of it, which refers to the weekday. The CUBEVALUE formula may be readily copied down without any modifications.

Conclusion

Calculated Fields are a wonderful choice for inserting your own formulae and performing computations inside Pivot Tables because of their scalability, versatility, and simplicity of maintenance. Calculated Fields, notwithstanding the above, have certain limits and constraints. As a result, they aren't the best tool for every circumstance you could encounter.

To minimize possible mistakes in your data analysis, it's critical that you comprehend what happens behind the scenes when you utilize pivot table calculations. It is much more critical that you grasp the bounds and constraints of calculated fields and calculated items.

CHAPTER FOUR

INTRODUCING POWER QUERY

Excel Power Query is among the most effective and user-friendly capabilities in Microsoft Excel. You may utilize Power Query to combine several files with a similar format, filter and manipulate data downloaded from any industry's database system, and show that in an Excel report. Power Query is an excellent substitute for Excel VBA since it allows you to analyze tables without scripting, see actions go through without executing a single macro, and quickly change the order of various stages by using the drag & drop feature.

Even among novices, Power Query is a user-friendly and useful technique since it doesn't need any coding knowledge to get going. Furthermore, the initial data source is unaffected. The end result looks like a picture of altered data imported into Excel. So, what's the big deal about that? Because the source data is not immediately imported, your Excel file will not get heavier.

To make data analysis and time-related computations easier, Excel Power Pivot is often used in conjunction with Power Query. Power Pivot allows you to analyze databases with millions of lines of content by obtaining gathered information based on business rules. It's just the next stage in the data process of conversion, allowing people to develop data models from tables that have already been cleansed by Power Query.

Understanding Power Query Basics

Understanding query steps

There are lots of things you need to know and understand about Power Query. They are to guide you on your experience with Power Query.

Below are some of them:

Power Query experiences

This interface provides the Power Query user experience. This interface's purpose is to make it easy for you to do the modifications you need by engaging with a user-friendly collection of ribbons, menus, buttons, and other interactive elements.

The Power Query Editor is where you link to a variety of data sources and perform hundreds of various data conversions by evaluating data and choosing transformations from the UI. These data transformation capabilities are universal across all data sources, regardless of the restrictions of the underlying data source. There are two Power Query Experiences which are **Power Query Online** and **Power Query for Desktop.**

Transformations

The transformation engine in Power Query contains a number of preconfigured conversion methods that may be accessed using the Power Query Editor's graphical interface. Simple changes like eliminating a column or filtering rows are frequent, as is utilizing the first row as a table header. Advanced transformations like merge, append, group by, pivot, and unpivot are also available. All of these conversions are available by selecting the transformation option from the menu and then applying the necessary settings.

DataFlows

Many programs, including Power BI and Excel, support Power Query. When you use Power Query inside a product, nevertheless, you can only use it with just that product. Dataflows are a cloud-based, sustainable product version of the Power Query experience. You can receive and manipulate data in an exact manner with dataflows, but rather than sending the result to Excel, you can save it in alternative storage solutions like Dataverse or Azure Data Lake Storage. The result of dataflows may then be used in other goods and services.

Power Query M Language

There are certain conversions that can't be done as well using the graphical editor in any data transformation situation. Several of these modifications may need unique setups and configurations that aren't presently supported by the desktop environment. For all Power Query transformations, the Power Query M formula language, often known as M, is used behind scenes by the Power Query engine.

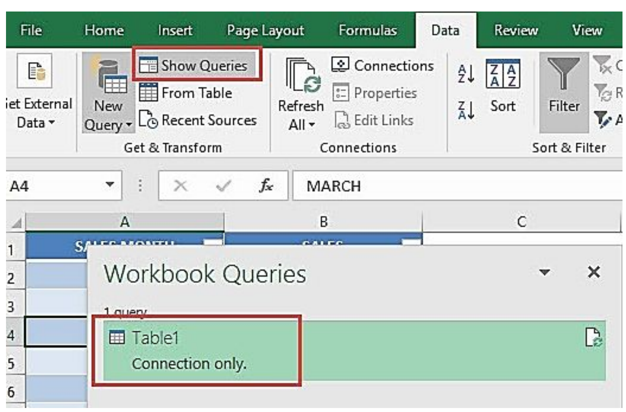
The M language is Power Query's data transformation language. Everything that occurs in the query is expressed in M at the end. You may utilize the Advanced Editor to examine the query's scripting and edit it as needed if you wish to execute advanced transformations with the Power Query engine. If the user interface functions and transformations aren't performing the precise modifications you require, utilize the M language and Advanced Query Editor.

Viewing the Advanced Query Editor

Using Power Query's Advanced Editor, you can conduct a variety of complicated tasks with any data source. But wouldn't it be more enjoyable if you knew what was going on under the surface? Let's walk through the processes in order to see how Power Query works. To see the current Power Query stages, we'll need to do the following:

Select **Data**. Choose **Get & Transform**, then pick **Show Queries** .

Now double click on the Table1 query.



The Power Query Editor will appear.

	SALES MONTH	SALES	Index
1	JANUARY	24640	1
2	FEBRUARY	4324	2
3	MARCH	29923	3
4	APRIL	66901	4
5	MAY	52432	5
6	JUNE	38281	6
7	JULY	57650	7
8	AUGUST	90967	8
9	SEPTEMBER	54354	9
10	OCTOBER	59531	10
11	NOVEMBER	54223	11
12	DECEMBER	87868	12

In the Index Column spreadsheet, you obtained earlier, you could see the Applied Steps we have.

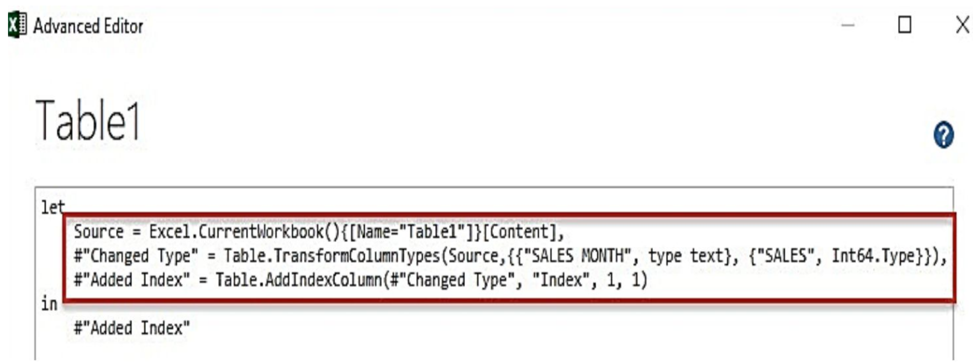
The following is a breakdown of the steps:

- **SOURCE:** Get the Table of Contents
- **TYPE CHANGE:** The Table's column types have been changed.
- **INDEX COLUMN ADDED:** An Index Column was added.

Now comes the exciting part! Select Advanced Editor from the drop-down menu at the top of the page.

You'll now see our precise three methods in detail!

- Use Table1 as a starting point.
- Modify the Sales Month column type to text as well as the Sales column type to number.
- Create a new index column named Index that begins at 1 and increases by 1 each time it is used.



You can now view what's going on behind the scenes of your Power Query transforms!

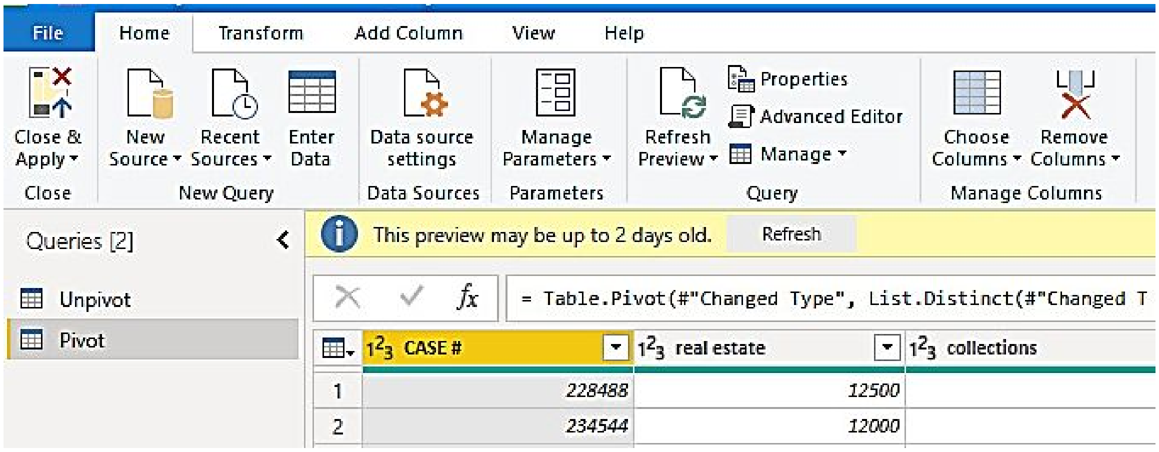
Refreshing Power Query Data

The underlying data underpinning the queries are often modified after we've developed them by inputting and editing fresh data. For instance, the finance department may get new data files that must be uploaded to current datasets, live online data may be updated, or the user may manually contribute additional data to the dataset. The benefit of refresh is that it allows you to build queries once and then reuse them by just renewing the connection to the data source, which may be anywhere. When calculating in Excel, the data engine will automatically recalculate whenever the data in the spreadsheet changes. Nevertheless, Power Query requires instructions on when to update data. Understanding refresh is essential for ensuring that the ultimate result of your data transformation is correct.

You never have to recall any steps from the last time you operated on the data if you use a refresh. As you may know, Power Query uses the M language code to record these stages as APPLIED STEPS. As a result, refreshing it is a straightforward procedure for Power Query, which involves loading or importing new data and then repeating the processes, this time with the new data.

Select the **Home Tab** | **Refresh Preview button**, then choose **Refresh All** to refresh all queries straight inside Power Query.

Refresh Preview, on the other hand, will simply refresh the current query. When dealing in Power Query, the refresh notification bar will appear right above the formula bar to notify you to update your queries, as illustrated in the following picture.



Keep in mind that refreshing all queries may take some time, particularly if the datasets are large. Another key point to remember is that while renewing all queries, the order in which they are refreshed is maintained. If we prefer to refresh queries separately and manually, we must do it in the exact sequence and at the exact time.

If your data source is stored in an external file, Power Query will only load the most recent version of the source. Even though the external file is open on the computer and you have recently updated it, you will need to save it in order for the refresh to reflect the most recent changes. If the source data and queries are both in the same worksheet, any changes will be instantly fused without the need to save them before refreshing. When renewing a query that is predicated on another query, keep in mind that not all of the queries will be renewed.

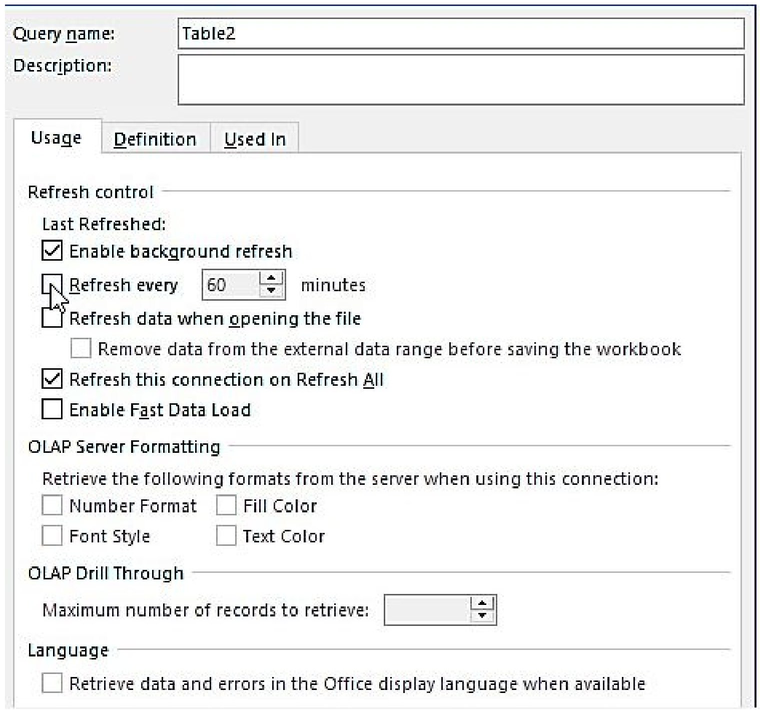
The background refresh option may be enabled to update automatically as we work. This strategy has both advantages and disadvantages. One advantage is that you may work while the refresh is occurring; however, you may alter a formula, recalculate, or edit Pivot tables while operating, and these changes may not be reflected if the background refresh is not yet finished. To discover how to refresh.

Follow the steps given below:

1. Ensure that Excel is open with an active query and connection before you enable the automatic background refresh. To refresh all

connection properties, go to Data | Refresh All Connection Properties...

2. Find the Refresh control heading on the Usage tab of the Query Properties dialog box.
3. Make sure Enable background refresh is turned on. Then, in minutes, choose a Refresh duration.



4. Whenever you open a file, you may select to refresh the data, as well as the connection, if you choose the Refresh All option.

5. Choose OK to verify the modifications you've made.

Managing existing queries

The Queries page contains information regarding the current queries as well as the ability to create new ones. The Queries page shows the queries that you have generated or that have been published to you for the specified project and data settings.

The screen also includes unreported queries made by any users in your login group.

1. Hover over through the Data Analysis icon (Data Analysis icon) in the left navigation window, then select Queries.
2. As needed, filter the list of your inquiries and queries that have been published to you.
   a. Choose the plan for which you wish to examine queries from the **Project drop-down list.**
   b. Choose the configuration for which you wish to examine queries from the **Configuration drop-down** selection.
   c. Choose the origin of the queries you wish to see from the **Origin drop-down box;** select — to see all kinds.

What you can do after that

1. Pick Rows to print, download, or delete multiple queries. Choose one or more rows by checking the boxes, or select the Select All option to check all rows (or Clear All to uncheck all rows). Then choose Print, Download, or Delete from the drop-down menu.
2. Click the Generate Using Query Wizard link to use the built-in Query Wizard to create a query.
3. To accomplish the following below, go to the Row Action menu (Row Action menu icon) in a query.
   a. Select **Run** and choose a data configuration to run the query.
   b. Pick **Generate Case Series** to run the query and create a case series from the results. When saving the case series, you choose a data configuration, examine variables and values, and optionally update the name, description, and project assignment.
   c. Pick **View** to see the query logic. This option displays the query's variables and values, as well as the logic.
   d. Pick **Report** and pick a data configuration to run the query and then a report against the cases detected by the query. The Report Definitions page comes when you execute the query.

To accomplish the following with queries you've made, go to the Row Action menu (Row Action menu icon) and select:

1. Click Copy to copy a query. After that, give the duplicate a name and save it.
2. Click Edit to make changes to the query. To choose an alternative data configuration, click Back.
3. Click Rename to rename the query. You may also alter its name or move it to a different project.
4. Pick Publish, choose the login group(s) and then click Back to publish the query. (You may publish settings produced by any user in your login group if you have the Administer Users capability.)

Hint: You may publish to numerous login groups, including —All–if you are a super user. Select login groups from the Publish to Login Groups drop-down list by clicking or Press the Control key as you click. If you publish an item to —All– and then create a new login group later, the object is immediately published to the new login group.

- Click Report and pick a data configuration to run the query and then a report against the cases detected by the query. The Report Definitions page comes when you execute the query.
- Click Delete to get rid of a query. Click OK when the popup asks whether you want to remove the query. The query has been removed from the Queries page and is no longer visible.

Note: Changing or removing a query has no impact on any case series, database constraints, custom terms, or interactive reports produced with it.

Merging columns using combine

We may combine data sources or data tables that have completely different architectures. The sole need is that the sources have a connection. This is often a standard field that connects one field in one data source to another field in another data source.

When we have a list of students in one database and data on payments made per pupil in another table, we can combine the two tables to flatten the data into one. The Merge tool allows you to choose a common field and construct a connection between the two tables, allowing you to merge data into a single flattened data table.

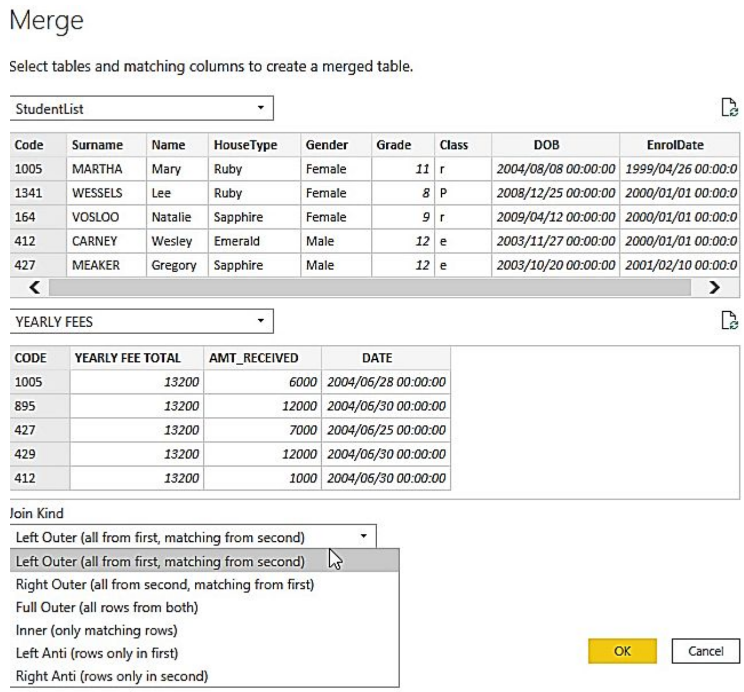
Let's get started:

1. Generate 2 queries using the data columns STUDENTS and YEARLY FEES in the SSGSchoolAdmin.accdb data source.
2. StudentList should be the new name for the Students2 query. A similar field named Code appears in both tables. This field will be used to connect the two tables together.

Go to Home | Merge Queries | Merge Queries as New: after clicking on the StudentList query.

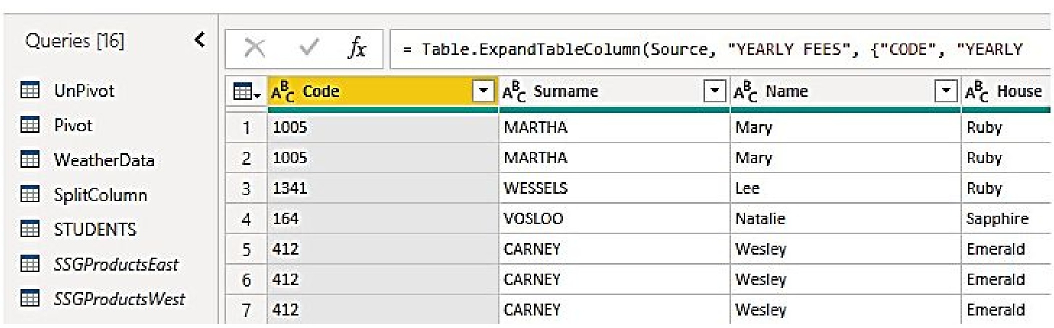
Choose Code from the STUDENTS table, which will be the joining field, in the Merge dialog box that appears. Choose the YEARLY FEES table from the second drop-down list, then tap the Code column to identify it as the matching join. The column headings of the connecting fields do not have to match.

If you have more than one corresponding column, just use the Control key + click approach to choose them in the order you want to combine them. After that, a value in order is set next to each matched column. You may also choose a Join Kind from the supplied drop-down list. The most popular is Left Outer (all from first, corresponding from second), which matches all fields from the first table and also matches fields from the second table.

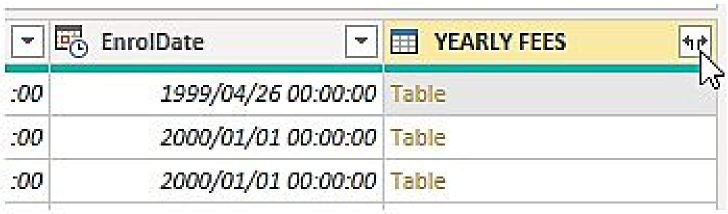


To finalize the merging, click OK.

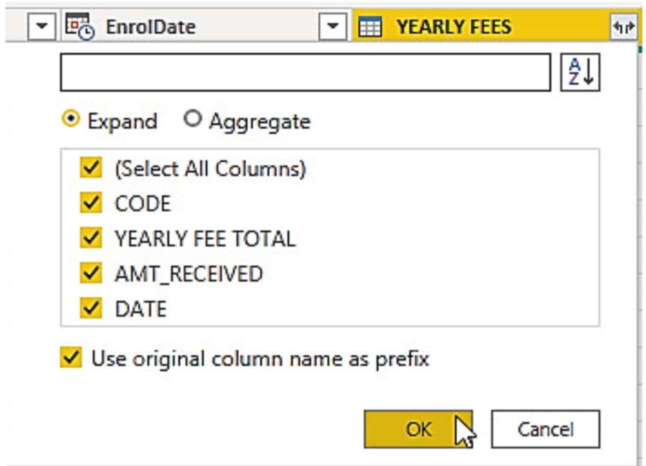
Together with the result, a new query named Merge1 will be produced. The YEARLY FEES column has been added to the table if you scroll to the extreme right of the table. This column is termed a structured column because it contains a structure (table) in each cell that displays another table whenever you click on the empty space (not the word Table) of the cell. As a result, Student 1005 has made two transactions toward the TOTAL YEARLY FEE:



We'll need to take it a move further and combine the data to simplify the structure since Power Query won't recognize the idea of a table inside a table. Toggle to the right of the YEARLY FEES column header and choose the Combine Files icon. The Combine group, which is placed on the Home tab ribbon, also has a Combine Files option:



Choose the fields you want to add in the combine process by clicking:



The tables are consolidated into a single table that can be used to evaluate data in Excel. You've now learned how to utilize the Combine tool to combine tables based on the main key.

Defining a query using the Query Wizard

The Query Wizard simplifies the process of selecting and combining data from various tables and columns in your database. You may choose which tables and fields to include in your query using the Query Wizard. When the wizard identifies a primary key field in one database and a field with the same name in a second table, an inner join (a query action that specifies that rows from two tables be merged based on identical field values) is constructed automatically.

The wizard may also be used to sort the results and do basic filtering. You have the option of returning the data to Excel or refining the query in Microsoft Query in the wizard's last step. You may execute the query in Excel or Microsoft Query once you've created it.

Take the instructions below to launch the Query Wizard.

1. Select **From Other Sources**, then **From Microsoft Query**, in the Get External Data group, on the Data tab.
2. Ensure that the Use the Query Wizard to create/edit queries check box is checked in the **Choose Data Source** dialog box.
3. Select the data source you wish to utilize by double-clicking it.

   -or-

   Click **OK** after selecting the data source you wish to utilize.

You may directly interact in Microsoft Query if you wish to write a more complicated query than the Query Wizard permits. You may use Microsoft Query to inspect and modify queries created using the Query Wizard, or you can utilize it to build new queries without utilizing the wizard. When you wish to develop queries that perform the following, work directly in Microsoft Query:

Choose particular information from a field. In a huge database, you may wish to pick and select part of the data in a field and leave out the information you don't need. For instance, if you only require data for two of the items in a field with information for many, you may use criteria to choose just the two items you require.

Every time you execute the query, it will return data based on various criteria. You may use a parameter query to construct the same Excel report or summary for many locations in the same external data, such as a different sales report for each region. Whenever you execute a parameter query, you'll be asked to provide a value to use as the criteria for selecting records. A parameter query, for instance, would ask you to input a certain area, and you can even reuse this query to build every one of your regional sales reports.

Data may be joined in several ways. The Query Wizard builds inner joins, which are the most frequent form of join used in query creation. However, there are situations when you'll want to employ a different form of join. An inner join (the kind generated by the Query Wizard) will restrict the retrieval of customer data for customers who have not made a purchase, for instance, if you possess a table of product sales data and a table of customer data. You may connect these tables using Microsoft Query to get all of the customer information as well as sales data for those who have placed orders.

Getting Data from External Sources

Microsoft Query can be used to get data from other sources. You won't have to rephrase the data you want to examine in Excel if you use Microsoft Query to obtain data from your business databases and files. You may also automatically refresh your Excel reports and summaries from the actual source database when it is updated with new data.

You may connect to external data sources using Microsoft Query, choose data from those other sources, import it into your worksheet, and refresh the data as required to maintain your worksheet data synced with the data in the external sources.

You can access a variety of databases. Microsoft Office Access, Microsoft SQL Server, and Microsoft SQL Server OLAP Services are among the databases from which you may access data. You can also get data from text files and Excel spreadsheets.

You may also get information from data sources not specified here, such as different kinds of OLAP databases, using ODBC drivers or data source drivers from other vendors. Check the database documentation or contact your database vendor for information on installing an ODBC driver or data source driver that isn't mentioned here.

Choosing information from a database: A query, which is a question regarding data stored in an external database, is used to get data from a database. You may wish to know the sales numbers for a given product by area if your data is housed in an Access database. By choosing just the data for the product and location you wish to investigate, you may obtain a subset of the data.

Utilizing Microsoft Query, you can pick and choose the columns of data you wish to import into Excel.

In a single process, you may update your worksheet. Whenever you have external data in an Excel worksheet, you may refresh the data to update your analysis without the need to constantly recreate your summary reports and charts anytime your database alters. You might, for instance, construct a monthly sales summary and update it every month when new sales statistics arrive.

Importing data from files

Getting data from Excel Workbooks

- Click on the **Get Data** option in the Power Query Data Tab.
- Choose **Excel Workbook** in the **Choose data source** box
- Pick **Browse** to choose the file you want to import
- Choose the data. Then, select the **Load** button.

Getting data from CSV and text files

You can import data from a text file into Excel in two ways: by opening it in Excel or by importing it as an external data range. Use the Save As command and choose the file type from the drop-down menu to export data from Excel to a text file.

There are two types of text files that are often used:

Delimited text files (.txt): TAB character (ASCII character code 009) commonly divides each field of text into delimited text files (.txt).

Comma separated values text files (.csv): The comma character (,) commonly divides each field of text in comma separated values text files (.csv).

In both delimited and.csv text files, you may modify the separator character. This may be essential in order to ensure that the import or export procedure goes as planned. There are a total of 1,048,576 rows and 16,384 columns that you may import or export.

1. Choose Data. Pick Get Data and select **From a File**, then pick **From a Text/CSV File**
2. Search for or input a path to the file you wish to query in the Comma-Separated Values Browse dialog box.

3. Choose **Open**.

Remember: When importing data from a CSV file, Power Query will discover column delimiters such as column names and types immediately. If you import the sample CSV file below, Power Query will utilize the first row as the column names and update the data type of each column.

Load a text file in Excel to import it.

Using the Open command, you may convert a text file written in another software into an Excel workbook. When you open a text file in Excel, the file's format remains the same – you can see this in the Excel title bar, where the file's name keeps the text file extension (for example, .txt or .csv).

1. Navigate to File > Open and navigate to the text file's location.
2. In the Open dialog box, choose Text Files from the file type selection list.
3. Locate the text file you wish to open and double-click it.
    - Excel launches the Import Text Wizard if the file is a text file (.txt). When you're through with the instructions, click Finish to finish the import. For additional information on delimiters and advanced settings, see Text Import Wizard.
    - Excel opens the text file and shows the contents in a new worksheet if the file is a.csv file.

***Note**: When Excel opens a.csv file, it interprets how to import each column of data using the current default data format settings. Use the Import Text Wizard if you want greater freedom when converting columns to alternative data formats.*

For instance, a data column in a.csv file may be MDY, but Excel's default data format is YMD, or you wish to convert a column of integers with leading zeros to text so that the leading zeros are preserved. You may compel Excel to execute the Import Text Wizard by changing the file's extension from.csv to.txt before opening it, or by linking to a text file.

Connect to a text file to import it.

Data from a text file may be imported into an existing spreadsheet.

1. Select the cell where you wish the contents from the text file to be entered.
2. Click From Text in the Get External Data category on the Data pane.
3. Locate and double-click the text file you wish to import in the Import Data dialog box, then click Import.

   Perform the Text Import Wizard's directions. For additional information about how to use the Text Import Wizard, hit the Help button picture on any page. When you've finished with the wizard's stages, select Finish to finish the import process.

4. **Do the following in the Import Data dialog box:**
   a. Do one of the following under **Where do you wish to place the data**?:
      - Choose the Existing worksheet to return the data to the place you specified.
      - Choose a New worksheet to restore the data to the upper-left corner of a new worksheet.

   b. To configure refresh, formatting, and layout settings for the imported data, click Properties.

   c. Click the OK button.

The external data range is saved in the place that you designate in Excel.

If Excel fails to convert a column of data to the desired format, you may transform the data after it has been imported. See Convert numbers saved as text to numbers and Convert dates stored as text to dates for further details.

Importing data from database systems

Importing data from relational and OLAP databases

You may establish a flexible relationship between an Excel workbook and a SQL Server Analysis Services Online Analytical Processing (OLAP) database server and then update it anytime the data changes. If an offline cube file has been produced on the database server, you may link to it. You may either import data as a

Table or a PivotTable report into Excel.

1. Select Get Data. Choose From Database. Then, Pick From SQL Server Analysis Services Database from the Data tab (Import). If the Get Data button isn't visible, choose New Query > From Database > From SQL Server Analysis Services Database instead.

2. Press OK after entering the Server name.

Note that you may specify an MDX or DAX query as well as a particular database name.

3. Choose the database, then perhaps the cube or tables you wish to link in the Navigator window.

4. To load the chosen table, click Load, or click Edit to apply further data filters and modifications before importing it.

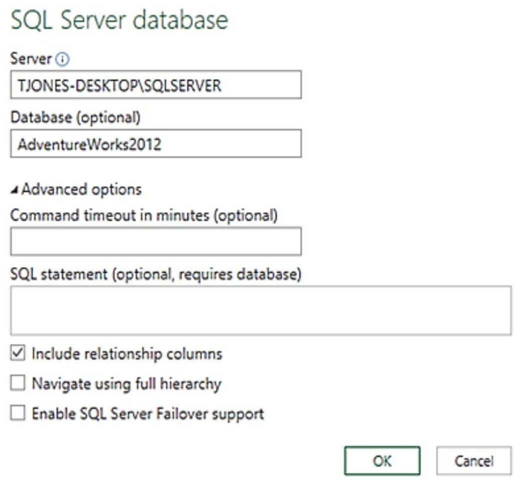
Importing data from the Azure database

Azure SQL Database is a mission-critical relational database created for the cloud that is strong, completely controlled, and extensible.

1. Choose Data. Select Get Data > From Azure. Then, choose From Azure SQL Database

2. In the Server Name field of the Microsoft SQL Database dialog box, enter the name of the SQL Server you want to connect to. You may also give a Database Name if you like.

3. Enter your query in the SQL Statement box if you wish to import data using a local database query.



4. Choose OK.
5. To connect to the SQL Server database, choose an authentication mode.
    a. Windows This is the pre-selected option. If you wish to connect using Windows authentication, check this box.
    b. Database If you wish to connect using SQL Server authentication, check this box. To connect to your SQL Server instance, pick this option and provide a user name and password.
6. By default, the Encrypt connection check box is checked, indicating that Power Query uses a secure link to link to your database. Uncheck this check box and then select Connect if you don't wish to connect utilizing a secure link.

   If you don't use a secure link to connect to your SQL Server, Power Query will urge you to use an unsecured connection. To connect via an unsecured connection, click OK on the message.

Importing data from ODBC connections to nonstandard databases

1. Navigate to the Data tab in Excel. After that, select **From Other Sources**, then From **Data Connection Wizard**.
2. To proceed, pick **ODBC DSN** from the popup window and click Next.

3. Next, choose a data source to link to and click Next.
4. Choose Next to input and save information about your new file, or click Finish to connect to the table holding the relevant data.
5. Choose how your data will be displayed in Excel and where it will be placed in the worksheet in the Import data window, then click OK.
6. The necessary information is now visible in the current Excel spreadsheet.

Getting data from other data systems

1. Select the Data tab
2. Select **From Other Sources**, then **From Microsoft Query** from the dropdown option.
3. You may choose the data source you wish to link to in the resulting dialog.
4. Following a good connection, pick the data you wish to see in Excel and hit Next.
5. The data may be filtered and sorted in the following two stages. To skip these steps, click **Next**.
6. You may store the query by hitting the **Save** button on the right if you want to use it again.
7. Hit **Finish** after selecting **Return Data To Microsoft Excel**.
8. Choose how your data will be displayed in Excel and where it will be placed in the worksheet in the **Import data** window, then click **OK**.
9. The necessary information has been successfully imported into Excel.

Managing data source settings

It's useful to know which dialog box to use when you need to inspect or control an external data source:

Utilize the **Recent Sources** dialog box to see a list of commonly used data sources that you've previously imported, as well as to make modifications to each data source's connection details.

To find or change data source credentials, or to configure privacy settings, utilize the **Edit Permissions** dialog box. Adjust privacy settings for additional information.

Set extra security parameters for native database queries, certificates, and authentication services using the **Query Options** dialog box. Increase the security of your data even further.

Editing data source settings

1. **Choose one of the following to bring up the Data Source Settings dialog box:**

   Choose **File**, **Home**, then **Data Source Settings** in Power Query.

   Pick **Data**, **Get Data**, then **Data Source Settings** in Excel.

2. **Choose one of the following options:**

   Data sources in the current workbook: The Change source button is also shown at the bottom of this choice, which is the default.

   Global Permissions: To make changes to all of your workbooks' permissions.

3. If you have a lot of data sources, type a search term in the Search data source settings box, or use the Sort A to Z function in Excel to sort by the name or type of data source.

4. To modify a data source, first, click it, then pick Data Source, and then make adjustments in the Data Source dialog box. This is the identical dialog box that appeared when the data was originally imported. A distinct dialog box appears for each kind of data source.

   Note: You may only examine the SQL query from this dialog box if the database has a Native Database Query (such as SQL).

5. You may clear permissions for the specified data source or all data sources using the **Clear Permissions/Clear All Permissions** option. Use this command with caution. You won't be able to reclaim permissions after they've been removed.
6. Select a data source from the list and then **Edit Permissions** to open the Edit Permissions dialog box.
7. Observe that the data source's authorization type, such as Anonymous, is shown under **Credentials**.
8. Pick **Delete** to remove the permission. The permission type has been changed to **Not Specified**.
9. Tap **Edit** to add or modify permission.
10. Choose the credential type you want in the left pane (colored green) of the dialog box:

    Hint: When the password is transmitted, it is not encrypted. Specific credential types aren't supported by all data sources.

    Anonymous: The data source may be accessed by anybody, and no credentials are necessary.

    Windows: Put your Windows login and password in this box.

    Basic: Fill up your username and password.

    APIs for the web: Enter a key that will allow you to access the Web source, which may need pre-registration.

    Organizational account: Log in to your school or work account.

Conclusion

In Power Query, all you have to do with power query is build table connections and combine queries. The nice aspect is that if you add new data to the amount list, the new table is automatically updated. In this chapter, you understood the different ways you can import different data sources from various places. Inside the Query Properties dialog box, we learned how data is refreshed and the many settings connected to refresh. Ensure that you utilize the samples and instructions given here very well while working with Power Query.

CHAPTER FIVE

TRANSFORMING DATA WITH POWER QUERY

Transforming data entails renaming tables or columns, as well as presenting the data for analysis. You'll learn how to turn tabular data into an approved tabular format using the Pivot and Unpivot tools. We'll eliminate any unneeded columns, rename column headings, and rename queries after utilizing these tools. We'll take note of the actions we took and learn how to use Power Query to update data sources. All of these processes are required to arrange the data for further investigation or reporting.

For a variety of reasons, data is presented in a variety of formats. Some, like a basic financial revenue budget with financial years as rows and months as column headings, might be made aesthetically attractive, while others could be more complicated and utilized for analysis using PivotTables and/or storing data in a data storage program like Power Query. Prior to completing any calculations or analyses, always consider the goal of the dataset you're dealing with and prepare the data. In these situations, Power Query is unquestionably the tool of choice for data transformation.

The drawback of not properly organizing a dataset may lead to a slew of analytical issues, and we end up spending time constructing several computations. If the dataset was properly prepared from the start, you wouldn't have to perform this.

There are a number of procedures to take when preparing data for use in PivotTables, for example, to ensure that you get the most out of summarizing and analyzing enormous datasets.

Prior to employing any analytic tool, we should follow the following guidelines:

1. Ensure that the spreadsheet doesn't include any duplicated data.

2. Delete any data filters you've applied and ungroup any cells you've grouped using Excel's Outline tool.

3. For each column in the spreadsheet, format the data type. This implies that dates must be formatted using the correct date format, with values such as number, currency, accounting, and so on. Ensure that the column headers are accurately labeled so that they are easy to understand and do not include lengthy details.

4. Do not use totals, subtotals, or average columns in your computations. The reason for this is because after data has been cleansed and converted in Power Query, it is analyzed using Power Pivot, Power BI, or Excel tools to arrive at various conclusions.

5. Any blank cells in the data source should be removed.

Performing common transformation tasks

The screenshot below depicts a source dataset that has been badly constructed for Power Pivot or any other analysis application.

The dataset does not follow the guidelines given in the previous section:

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1						QUARTER ONE				QUARTER 2				QUARTER 3		
2	Season	Winery	Label	Region	Cost Per Case	JAN SALES	FEB SALES	MAR SALES	Q1 SALES	APR SALES	MAY SALES	JUNE SALES	Q2 SALES	JULY SALES	AUG SALES	SEPT SALES
3	Winter	Matts Winery	Cab Savon	North	£165.00	450	526	926	£313 830.00	779	1144	929	£470 580.00	305	1148	333
4	Winter	Matts Winery	Cab Savon	North	£165.00	550	1038	409	£329 505.00	416	724	971	£348 315.00	530	565	327
5	Autumn	Matts Winery	Cab Savon	North	£165.00	575	1025	331	£318 615.00	790	364	1198	£388 080.00	983	692	861
6	Spring	Matts Winery	Cab Savon	North	£165.00	650	523	723	£312 840.00	774	392	949	£348 975.00	1105	530	576
7	Summer	Matts Winery	Cab Savon	South	£165.00	320	800	306	£235 290.00	360	363	778	£247 665.00	391	368	1043
8	Winter	Matts Winery	Cab Savon	South	£165.00	325	938	558	£300 465.00	723	351	572	£271 590.00	747	1196	1069
9	Autumn	Matts Winery	Cab Savon	South	£165.00	330	420	648	£230 670.00	851	342	395	£262 020.00	451	403	519
10	Spring	Matts Winery	Cab Savon	South	£165.00	350	804	1015	£357 885.00	680	534	529	£287 595.00	792	978	737
11	Summer	Matts Winery	Cab Savon	East	£165.00	350	766	593	£281 985.00	743	827	508	£342 870.00	768	651	870
12	Winter	Matts Winery	Cab Savon	East	£165.00	360	1083	851	£378 510.00	449	888	355	£279 180.00	562	562	892
13	Autumn	Matts Winery	Cab Savon	East	£165.00	370	780	1164	£381 810.00	532	373	938	£304 095.00	964	1039	864
14	Spring	Matts Winery	Cab Savon	East	£165.00	375	860	412	£271 755.00	897	830	521	£370 920.00	764	534	969
15	Summer	Matts Winery	Cab Savon	West	£165.00	230	1080	489	£296 835.00	669	732	426	£301 455.00	760	1018	959
16	Winter	Matts Winery	Cab Savon	West	£165.00	235	1068	1083	£393 690.00	618	1082	727	£400 455.00	879	787	686

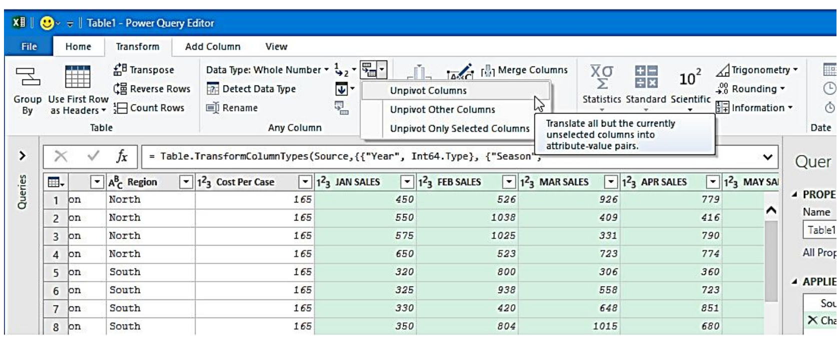
It includes extra quarter-by-quarter computation columns, as well as the final total sales. It's also possible to delete the combined column heads. Within Power Query, the Region column may likewise be transformed from rows to columns after this is done.

The dataset seems much more appealing after following the adjustments to arrange the data for analysis, but we still need to edit it a bit further using Power Query's Unpivot tool. We'll utilize the sales columns from January to September to show the Unpivot tool. Rather than having distinct columns for each of the three quarters' sales numbers, we'll combine the data from all nine columns into two rows.

Let's begin.

In Power Query, load the dataset **YearlyProductSales.xlsx**. This may be done using Excel

In the dataset, select all nine sales columns. Then, from the Any Column group, Pick **Transform | Unpivot | Unpivot Columns**.



A column for Attribute, which lists the months, and a column for Value instances, which are connected with each month, are produced as a result.

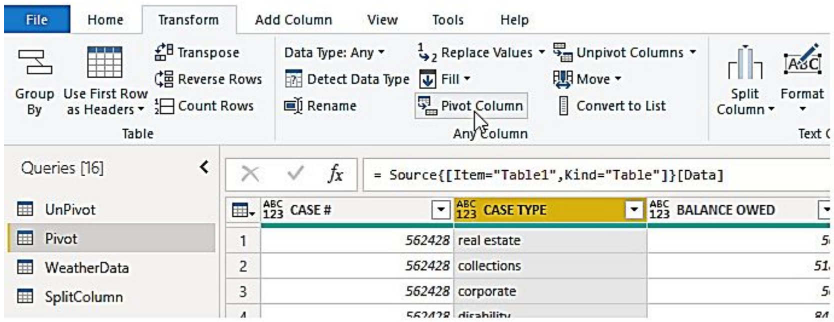
Cost Per Case	Attribute	Value
165	JAN SALES	450
165	FEB SALES	526
165	MAR SALES	926
165	APR SALES	779

Rename the columns to make them more appropriate for the table's content. Just double-click the Attribute column header and change the wording to anything you like. Carry out the same procedure with the Value column.

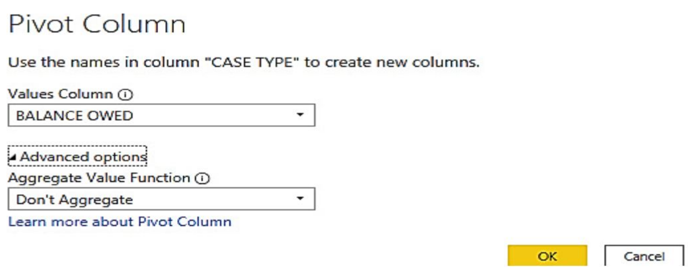
Simply go to the **APPLIED STEPS** window to view, delete, rename, or reorder steps you've applied to the data if you need to undo a previously performed step or if you want to know if a certain step was performed on the query data. Click the red cross to the left of the applied step to delete it, or right-click on a specific step to access various options.

Let's try the Pivot column option, which works in the opposite direction of the Unpivot feature by displaying data from rows across columns using the names of the data. For this example, make sure you're utilizing the SafestSolutionsLaw.xlsx data source.

To utilize the items in the **CASE TYPE** column to base the new columns on, choose the column. Then select Transform | Pivot: from the drop-down menu.



Choose **BALANCED OWED** from the Values Column.



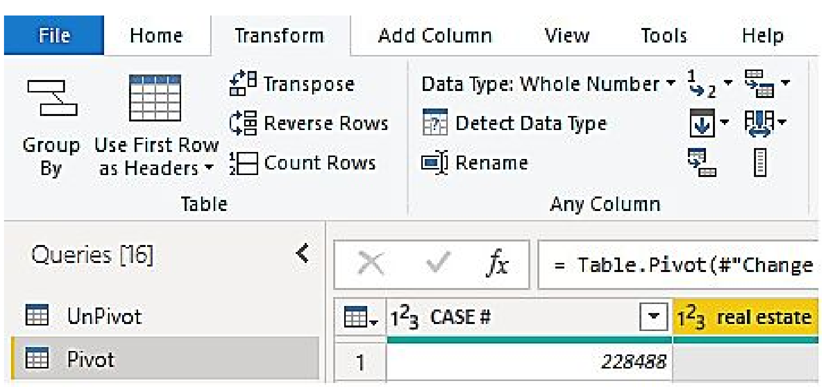
We don't want to sum values at this point, so select **Advanced** options and choose **Don't Aggregate** for the **Aggregate Value Function**.

To see the Pivot's result, select **OK**.

	CASE #	real estate	collections	corporate	disability
1	228488	12500	1000	13000	12000
2	234544	12000	1000	750	2000
3	536921	12500	5500	12000	1090
4	562428	50	518	50	841

In the Queries pane, we can now see two newly created queries.

Change the names of the first and second queries to UnPivot and Pivot, respectively:



With that knowledge, you should feel comfortable utilizing Power Query's Pivot and UnPivot tools to transpose row and column data. We'll look at the several refresh choices and how the refresh process works in the following section.

Removing duplicate records

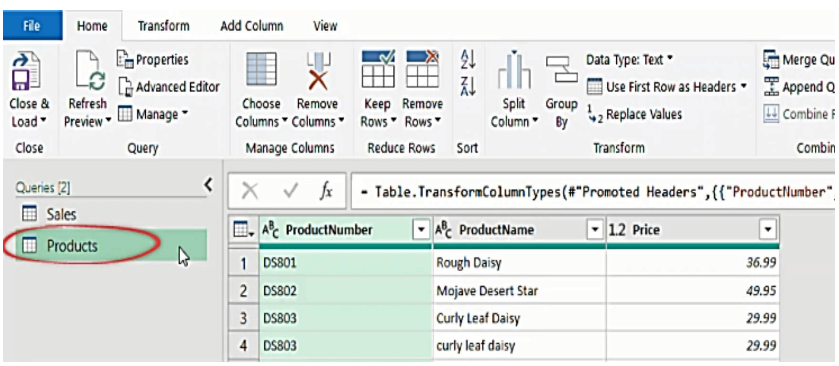
An exterior data source may not be as reliable as you think. Among the most vexing qualities of low-quality data is the prevalence of duplicates.

Two goods with ProductNumber DS803 may be found in the Products table if you look attentively.

	A	B	C	D	E
1	ProductNumber	ProductName	Price		
2	DS801	Rough Daisy	36.99		
3	DS802	Mojave Desert Star	49.95		
4	DS803	Curly Leaf Daisy	29.99		
5	DS803	curly leaf daisy	29.99		
6	DS804	Chrysanthemum Daisy	37.99		
7	DS805	Barberton Daisy	49		

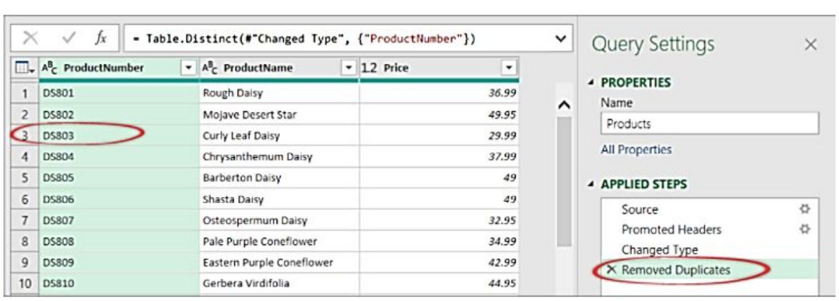
Follow the methods below to get rid of the duplicates listed above:

- Make that the Products query is selected in the Power Query Editor.



- Choose Remove Rows. Pick Remove Duplicates from the Home tab.

- One of the rows with the **ProductNumber** DS803 has been deleted, and a new step has been added to the APPLIED STEPS pane.



- Close and load the window by clicking the Close & Load button. The Products table in your worksheet will be refreshed as a result of this.

Filling in blank fields

Utilize the Use First Row as Headers split icon drop-down on the Transform tab to demote the header row by selecting "Use Headers as First Row." The first row in the table will be the header row.

The Transform Tab's Transpose button should be clicked. The rows become columns when the table is turned on its side.

Everything but apart from the first column should be selected. After selecting the second column, press Shift and choose the last column or Control key + A, then Control key + Click the first column.

To fill the null (blank) cells, click the Fill > Down button on the Transform tab.

To reposition the table, click the Transpose button on the Transform tab.

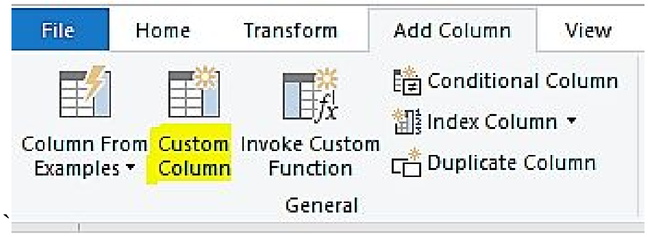
To restore the headers, choose the Use First Row as Headers option from the transform tab.

If you really want to fill the table completely, this method works great. If there are further columns off to the right that might include gaps that you don't want to be filled, it could be best to generate the filled values in new columns using an If statement (conditional column).

Concatenating columns

Merging data in columns might be handy, for example, to create a lookup helper column.

We utilize the 'Custom column' option in Power Query to merge columns. Go over to the 'Add Column' tab in the Power Query Editor window and click the Custom Column icon.



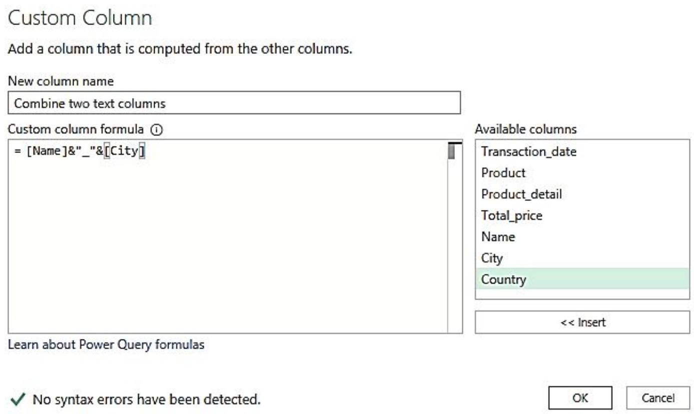
Hint: We're not repartitioning our current columns by utilizing Custom Column.

You name the new column and put your formula in the custom column formula field in the Custom Column dialog box. The column header may also be changed or named in the main Power Query Editor window.

Hint: If you click the I information symbol above the box, Excel will tell you that you may press Ctrl-Space to see a list of possible columns and additional formula options.

=[Column1] & [Column2] & "_" & [Column3]

In Power Query, the fundamental syntax for concatenating is to put column names in square brackets [] and separate them with the & (ampersand) symbol. To incorporate more text strings, wrap them in double quotation marks, such as &"_"& divide the column data with an underscore.



ABC 123 Combine two text columns
Lin_Chicago
Davenport_Rayford
Gibson_Escondido
Benson_Tesvikiye
Kennedy_Centurion
Martinez_York
Howe_Ashburn
Gaines_Los Angeles
Pennington_Edgewood
Barron_New York
Simmons_Basingstoke
Hernandez_Eindhoven
Jenkins_Shavano Park
Schneider_Eagle
Brock_Riverside

Changing case

There's an entire category of Excel functions dedicated to dealing with text, and these three will assist us in changing the case of the text.

The LOWER function only accepts one input, which is the text to be converted to lower case characters. The function will return text that is entirely in lower case.

=LOWER(Text)

Names	Lower
Kelsie BURNS	kelsie burns
dara fowler	dara fowler
MARVIN ROBERSON	=LOWER([@Names])
jAMES wATSON	james watson
kyla whitaker	kyla whitaker
dylan wiley	dylan wiley
EvAn WaRe	evan ware
diana battle	diana battle
melvin Weeks	melvin weeks
Carson Holloway	carson holloway

The UPPER function accepts just one argument: the text to be converted to upper case characters. The function will return text in full capital letters.

=UPPER(Text)

Names	Upper
Kelsie BURNS	KELSIE BURNS
dara fowler	DARA FOWLER
MARVIN ROBERSON	=UPPER([@Names])
jAMES wATSON	JAMES WATSON
kyla whitaker	KYLA WHITAKER
dylan wiley	DYLAN WILEY
EvAn WaRe	EVAN WARE
diana battle	DIANA BATTLE
melvin Weeks	MELVIN WEEKS
Carson Holloway	CARSON HOLLOWAY

The PROPER function accepts just one input, which is the text to be converted to proper case. The function will return text in all appropriate cases, with each word beginning with a capital letter and ending with lower case letters.

=PROPER(Text)

Names	Proper
Kelsie BURNS	Kelsie Burns
dara fowler	Dara Fowler
MARVIN ROBERSON	=PROPER([@Names])
jAMES wATSON	James Watson
kyla whitaker	Kyla Whitaker
dylan wiley	Dylan Wiley
EvAn WaRe	Evan Ware
diana battle	Diana Battle
melvin Weeks	Melvin Weeks
Carson Holloway	Carson Holloway

Finding and replacing specific text

In Power Query, you may substitute one value in a specified column with another one. You may change individual values or the entire value in a cell. Changing values in a query has no effect on the external data source.

Replacing Text Values

Text values' default behavior is to find for and replace a given text string. This is a behavior that can be altered.

- To open a query, choose one that has already been loaded from the Power Query Editor, pick a cell in the data, and then go to Query > Edit.
- Choose a text data type for a column.
- Choose Home or Transform > Replace Value from the drop-down menu. The dialog box Replace Values displays.
- Enter the value to be searched in the Value To Find box.
- Enter the value to be replaced in the Replace With box.
- Perform one or more of the following actions under Advanced options:

Match Specific text values are substituted by default. Select Match full cell contents to replace the entire cell value.

Characters who are unique Select Insert **special characters** and then one of the options from the drop-down list: Tab, Carriage Return, Line Feed, Carriage Return, and Line Feed, Carriage Return and Line Feed, and Non-breaking Space.

- Choose OK.

Replace Number, date, time, or logical values

For non-text columns, the default action is to search and replace the whole contents of a cell.

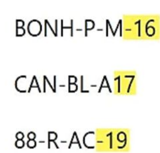
This is an unchangeable habit.

- To open a query, choose one that has already been loaded from the Power Query Editor, pick a cell in the data, and then go to Query > Edit.
- Choose a numeric, date/time, or logical data type for a column.
- Choose Home or Transform > Replace Value from the drop-down menu. The dialog box Replace Values displays.
- Enter the value to be searched in the Value To Find box.
- Enter the value to be replaced in the Replace With box.
- Choose OK.

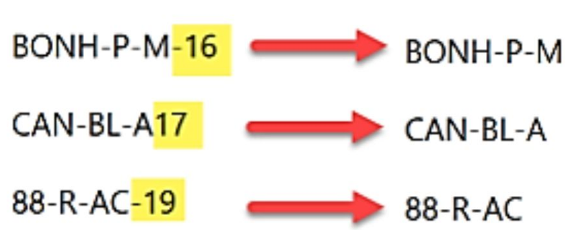
Trimming and cleaning text

You may have utilized the Trim-function (Text.TrimStart or Text.TrimEnd) to remove preceding or the following whitespace from your strings while cleaning bad data. Exactly, do you know, though, that you can use these methods to remove any additional characters from the beginning or end of a string? Trimming text using custom characters is a simple process:

Assume you have a column with the following values:



And you want to get rid of every number at the end, as well as every "-" that is directly linked to a number. So that the end product looks like this:



By default, the Text only accepts one parameter. TrimStart or Text are two options. TrimEnd is a function that removes whitespace characters from a string.

Text.TrimEnd(text as nullable text, optional trim as any) as nullable text

However, the second option allows you to provide a list of your own characters to be eliminated. As a result, I can make a list of all the characters that should be eliminated from the end, as follows:

"0"...."9" & "-"

This combines two lists: The first list has ten items, all of which are integers as strings. The second list has just one item: "-." I also need to place this element in a list so that I may use the ampersand ("&") as a simple concatenator.

So here's the whole statement for the "Add custom column" dialog:

Text.TrimEnd([MyColumnName], {"0".."9"} & {"-"})

You can see this in action by pasting the following code into the advanced editor and following the steps:let

```
Source =
Table.FromRows(Json.Document(Binary.Decompress(Binary.FromText("i45WcvL389AN0PXVNTRTitWJVnJ29N
BinaryEncoding.Base64), Compression.Deflate)), let _t = ((type text) meta [Serialized.Text = true]) in type table [p

#"Changed Type" = Table.TransformColumnTypes(Source,{{"product_name", type text}}),

#"Added Custom" = Table.AddColumn(#"Changed Type", "Custom", each Text.TrimEnd([product_name], {"0".."9

in

#"Added Custom"
```

Extracting characters

Whenever working with data in Excel which has been transferred from another source, the text is frequently not formatted as you would want. Product referencing may be made up of a product code, a code reference, and a product category all combined into one piece of text that displays in one worksheet column. Your need is to break the appropriate portions of the text string into separate cells in your worksheet.

This might be due to the fact that you wish to sort or group by a certain chunk of text. On that divided piece, you could also wish to employ additional equations. For instance, you could wish to use that chunk of text as the lookup value in another table of data. With data in its initial state, it would be unfeasible. If you're utilizing the data in a pivot table, you may need a distinct column for the split data to enable filtering and consolidation.

Extracting the left, right, and middle values

The functions Left, Mid, and Right return a piece of a string.

1. The initial characters of a string are returned by the left.
2. The middle characters of a string are returned by mid.
3. The concluding characters of a string are returned by right.

When you provide a single string as an argument, the function returns the piece of the string that you requested. When you supply a single-column table containing strings, the method produces a single-column table containing the sections of those strings that you requested. As described in Working with Tables, you can transform a multi-column table into a single-column table.

Mid returns blank if the beginning point is negative or beyond the end of the string. The Len function may be used to determine the length of a string. If you ask for more characters than the string can hold, the function will return as many as it can.

Syntax

Left(String, NumberOfCharacters)

Mid(String, StartingPosition [, NumberOfCharacters])

Right(String, NumberOfCharacters)

- **String** - This field is required. The string from which the result will be extracted.
- **Starting Position** - This field is required (Mid only). This is the beginning point. Position 1 is the first character in the string.
- **NumberOfCharacters** - This field is required (Left and Right only). The maximum amount of characters that will be returned. If the Mid function is not specified, the function returns the chunk of the string from the beginning to the end.

Left(SingleColumnTable, NumberOfCharacters)

Mid(SingleColumnTable, StartingPosition [, NumberOfCharacters])

Right (SingleColumnTable, NumberOfCharacters)

- **SingleColumnTable** - This is a must-have. The results will be extracted from a single-column table of strings.
- **Starting Position** - This field is required (Mid only). This is the beginning point. Position 1 is the first character in the string.
- **NumberOfCharacters** - This field is required (Left and Right only). The maximum amount of characters that will be returned. If the Mid function is not specified, the function returns the chunk of the string from the beginning to the end.

Extracting first and last characters

	A	B	C	D	E
1					
2		ProductSKU	ModelName	ProductPrice	
3		LJ-0192-SS	Long-Sleeve Logo Jersey	$48.07	
4		BK-R93R-56	Road-150	$3,578.27	
5		VE-C304-MM	Classic Vest	$63.50	
6		GL-H102-MM	Half-Finger Gloves	$23.55	
7		BK-M82B-42	Mountain-100	$3,374.99	
8		PD-R853-NA	HL Road Pedal	$80.99	
9		BK-M82B-44	Mountain-100	$3,374.99	
10		LJ-0192-XL	Long-Sleeve Logo Jersey	$48.07	
11		BK-R50B-62	Road-650	$699.10	
12		FR-T67U-58	LL Touring Frame	$333.42	
13					

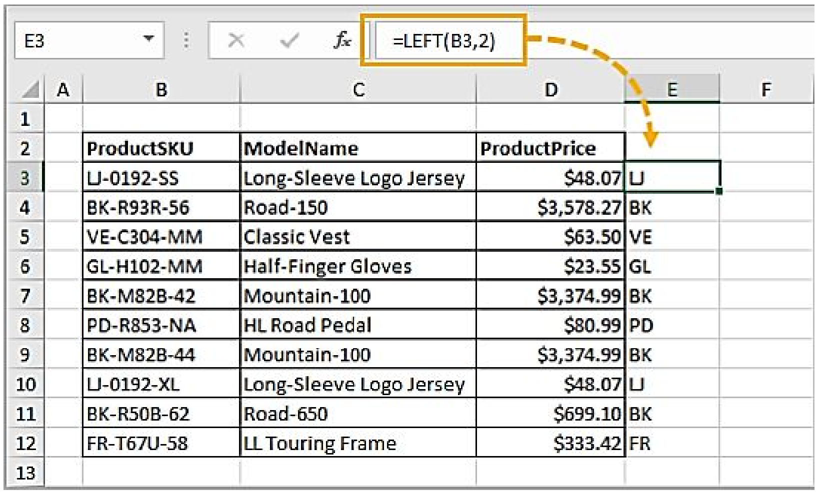
The first and final two characters from the **ProductSKU** in the aforementioned set of little product data will be extracted in the instance in this topic. The product category code is found in the first two characters of the SKU, while the product size is found in the final two characters. We will utilize the Excel LEFT and RIGHT

Functions in doing this. The syntax of the formulas is as follows:

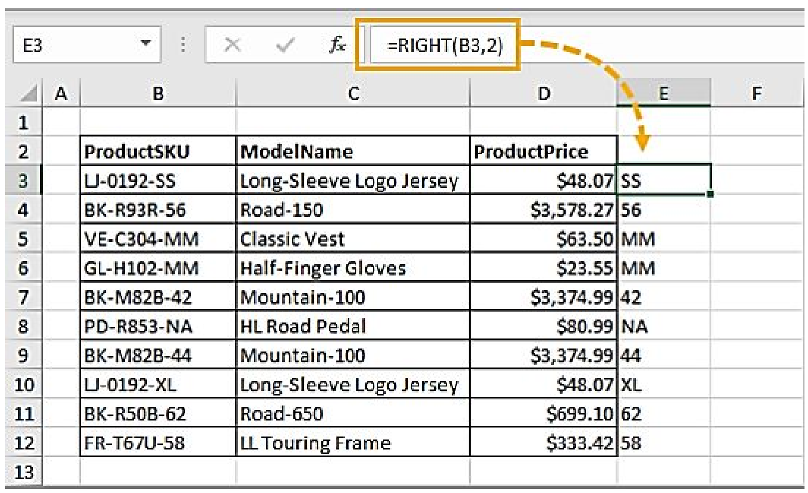
LEFT (Text, [Number]) and RIGHT (Text, [Number]).

Text – The textual string from which you want to extract information. Inside a workbook, it can also be a legitimate cell reference.

Number [Optional] – This is the number of characters from the text string that you want to extract. A value that is larger than or equal to zero is required. All characters will be provided if the value is larger than the size of the string of text. If the value isn't specified, it's considered to be one.


E3 =LEFT(B3,2)

	A	B	C	D	E	F
1						
2		ProductSKU	ModelName	ProductPrice		
3		LJ-0192-SS	Long-Sleeve Logo Jersey	$48.07	LJ	
4		BK-R93R-56	Road-150	$3,578.27	BK	
5		VE-C304-MM	Classic Vest	$63.50	VE	
6		GL-H102-MM	Half-Finger Gloves	$23.55	GL	
7		BK-M82B-42	Mountain-100	$3,374.99	BK	
8		PD-R853-NA	HL Road Pedal	$80.99	PD	
9		BK-M82B-44	Mountain-100	$3,374.99	BK	
10		LJ-0192-XL	Long-Sleeve Logo Jersey	$48.07	LJ	
11		BK-R50B-62	Road-650	$699.10	BK	
12		FR-T67U-58	LL Touring Frame	$333.42	FR	
13						


E3 =RIGHT(B3,2)

	A	B	C	D	E	F
1						
2		ProductSKU	ModelName	ProductPrice		
3		LJ-0192-SS	Long-Sleeve Logo Jersey	$48.07	SS	
4		BK-R93R-56	Road-150	$3,578.27	56	
5		VE-C304-MM	Classic Vest	$63.50	MM	
6		GL-H102-MM	Half-Finger Gloves	$23.55	MM	
7		BK-M82B-42	Mountain-100	$3,374.99	42	
8		PD-R853-NA	HL Road Pedal	$80.99	NA	
9		BK-M82B-44	Mountain-100	$3,374.99	44	
10		LJ-0192-XL	Long-Sleeve Logo Jersey	$48.07	XL	
11		BK-R50B-62	Road-650	$699.10	62	
12		FR-T67U-58	LL Touring Frame	$333.42	58	
13						

Splitting columns using character markers

In Power Pivot, divide a column. Data > Text to columns > Delimited > Space > Finish in Excel. After that, import the data into PowerPivot.

In Power Query, divide a column. A column of text may be divided into numerous columns in Power Query using the Query Editor in one of two different ways: by delimiter or by a group of characters.

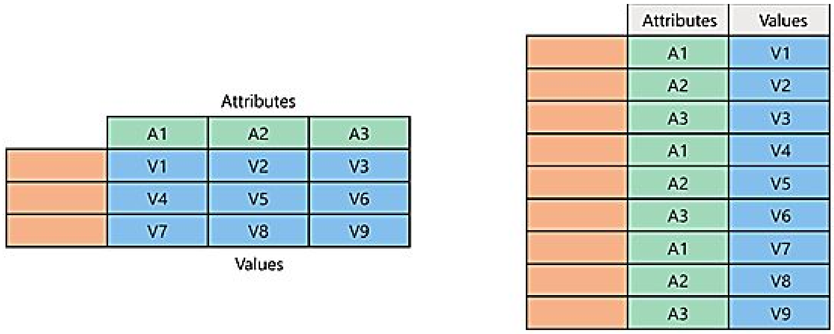
By Delimiter divides a text value into two or more columns depending on a common character. The comma (,) character may be used to break a Name column into two columns, such as LastName, FirstName.

By Number of Characters decodes a text value depending on the location of a character inside it.

Unpivoting columns

You may wish to unpivot data, also known as flattening data, in order to convert it to a graphical form with all related values in one column.

Whenever you unpivot, you extract the criterion pairs that constitute the new columns' intersection points and re-orient them into flattening columns as follows.



Values are unpivoted into a separate column (in blue on the left)

Attributes (on the left in green) are unpivoted into a separate column (on the right in green), and repetitions are transferred to the new Values column.

So,

Country	6/1/2020	7/1/2020	8/1/2020
Canada	357	421	254
Panama	20	40	80
USA	785	450	567

1. To start a query, choose one that has already been imported from the Power Query Editor, pick a cell in the data, and then go to Query > Edit.
2. Choose one or more columns to work with. Pick all columns except Country in this sample. Press Shift key + Click or Control key + Click on each successive column to pick more than one column sequentially or discontinuously.
3. Choose Unpivot Columns from the Transform menu.

Unpivoting other columns

This command unpivots columns that have not been chosen. Whenever not all columns in a query are specified, use this command. During a refresh process, new columns are also unpivoted.

- To open a query, choose one that has already been loaded from the Power Query Editor, pick a cell in the data, and then go to Query > Edit.
- Choose the columns you don't want to unpivot from the list. Press Shift key + Click or Control key + Click on each successive column to pick more than one column sequentially or discontinuously.
- Pick Unpivot Other Columns from the Transform menu.

Creating custom columns

Adding a custom column to your query can be done by generating a formula. The syntax of the formula will be validated by Power Query just as the Query Editing box does. Assuming you require more freedom in adding additional columns than what Power Query offers out of the box, you may use the Power Query M formula language to construct your own custom column.

Assume that you do have a table with the columns shown below.

	Date	Country	Units	Unit Price	Discount
1	2/1/2020	Panama	40	1.25	0%
2	3/1/2020	Panama	50	2.25	5%
3	2/1/2020	USA	150	3.45	10%
4	3/1/2020	USA	175	3.85	15%
5	2/1/2020	Canada	100	2.75	7%
6	3/1/2020	Canada	90	2.95	8%

You want to make two new columns out of the Units, Unit Price, and Discount columns:

1. Total Sale Before Discount: Multiply the Units column by the Unit Price column to get the total sale prior discount.
2. Total Sale after Discount: Multiply the Total Sale before Discount column by the net percentage value to get the total sale after discount (one minus the discount value).

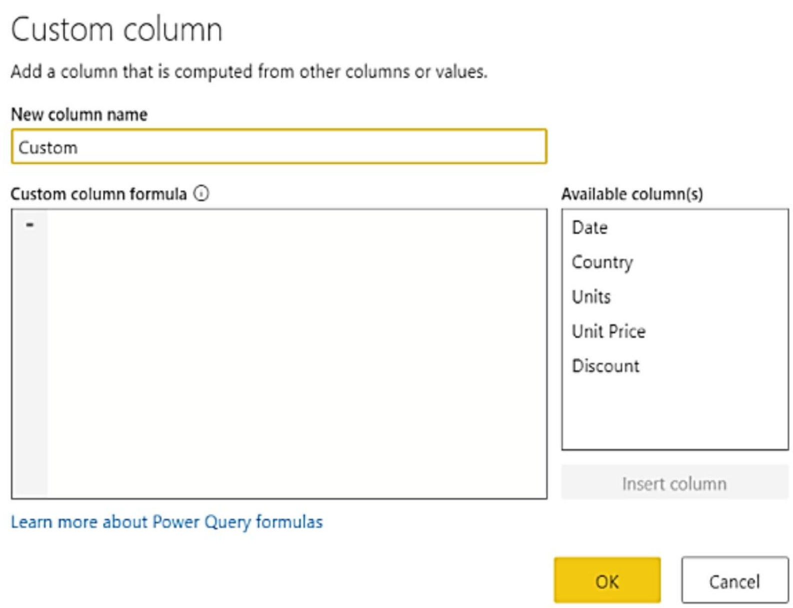
The aim is to create a table with additional columns that resemble the one below.

	Date	Country	Units	Unit Price	Discount	Total Sale before Discount	Total Sale after Discount
1	2/1/2020	Panama	40	1.25	0%	50	50
2	3/1/2020	Panama	50	2.25	5%	112.5	106.88
3	2/1/2020	USA	150	3.45	10%	517.5	465.75
4	3/1/2020	USA	175	3.85	15%	673.75	572.69
5	2/1/2020	Canada	100	2.75	7%	275	255.75
6	3/1/2020	Canada	90	2.95	8%	265.5	244.26

Let's create the custom column.

Navigate to the Add Column tab. Choose Custom Column

This will show the Custom Column dialog box. In the box, you will define the formula to create the column.



Choose a column from the Available columns list on the right-hand side of the dialog box to create a new custom column. Then, underneath the list, pick the Insert column button to include it in the custom column formula. You can also include a column to the list by choosing it from the drop-down menu. Additionally, you may use the Power Query M formula language in the Custom column formula box to create your own formula.

Understanding data type conversions

If you get an error while choosing a data transformation option, it's possible that the column's existing data type doesn't allow the translation you've chosen. For certain data formats, not all transformations are possible. If a column's existing data type is either a number (whole or decimal) or text, you could only alter it to a Boolean data type. As a result, for the data in the column, you must select a suitable data type.

Power Pivot will notify you about potential modifications to your data after you select an adequate data type, such as precision loss or truncation. Adopt the current data type by clicking OK.

If the data type is permitted, but Power Pivot discovers values that aren't assisted by the new data type, you'll receive additional mistakes and will have to modify the data values before continuing.

Understanding the present data type

Excel analyzes the columns of data to determine what data types each column includes whenever you add data to a Data Model. It provides the most exact data type to the column if the data in that column is constant.

When you import data from Excel or from an alternative source that doesn't require the usage of an individual data type in each column, Excel creates a data type that can hold all of the values in the column. Excel uses a decimal data type when a column includes numbers of various sorts, such as integers, long numbers, and money. If a column contains both numbers and text, Excel applies the text data type.

If you discover that your data is of a different data type than you expected, you have numerous options.

The data may be re-imported. To do so, re-import the column using the inherent relationship to the data source. You may be eligible to employ a filter during import to eliminate troublesome values, based on the sample source type. If you want to filter data during import, you'll need to use the Power Pivot add-in.

To produce a new value of the required data type, you may use a DAX formula in a calculated column. For instance, you may use the TRUNC function to transform a decimal number into a whole integer, or you can utilize a combination of information and logical functions to test and transform values.

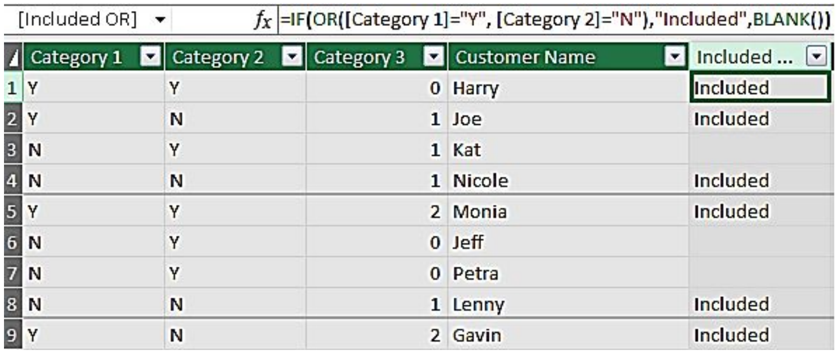
Adding conditional logic to custom columns

A table with three main categories and a column containing customer names has been created. We'll presume that this Table was obtained using Power Query (also known as getting & Transform) and imported into our Power Pivot data model.

Let's pretend for the sake of this example that we want to develop a conditional column that returns "Included" if a client is "Y" in Category 1 and "N" in Category 2.

To create our own column, we'll use the following code:

=IF(OR([Category 1]="Y", [Category 2]="N"),"Included",BLANK())



[Included OR] fx =IF(OR([Category 1]="Y", [Category 2]="N"),"Included",BLANK())

	Category 1	Category 2	Category 3	Customer Name	Included ...
1	Y	Y	0	Harry	Included
2	Y	N	1	Joe	Included
3	N	Y	1	Kat	
4	N	N	1	Nicole	Included
5	Y	Y	2	Monia	Included
6	N	Y	0	Jeff	
7	N	Y	0	Petra	
8	N	N	1	Lenny	Included
9	Y	N	2	Gavin	Included

What if we want a three-condition conditional column?

1. Category 1 = “N”
2. Category 2 = “Y”
3. Category 3 > 1

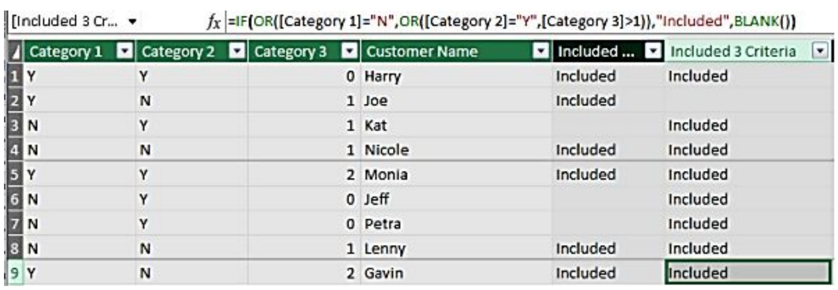
Remember that Power Pivot's OR function only supports two conclusory statements:

OR(Logical 1, Logical 2)

We'll have to resort to using the dreaded nested IF formula:

=IF(OR([Category 1]="N",OR([Category 2]="Y",[Category 3]>1)),"Included",BLANK())

We accomplish the desired outcome:



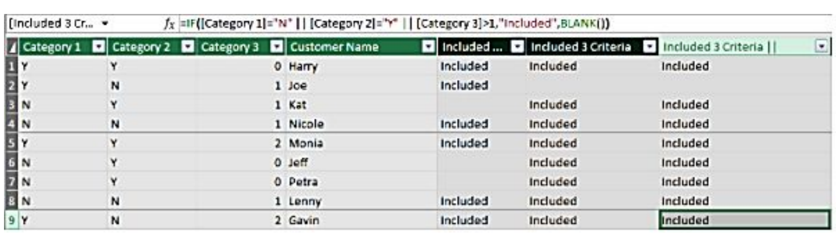
[Included 3 Cr... fx =IF(OR([Category 1]="N",OR([Category 2]="Y",[Category 3]>1)),"Included",BLANK())

	Category 1	Category 2	Category 3	Customer Name	Included ...	Included 3 Criteria
1	Y	Y	0	Harry	Included	Included
2	Y	N	1	Joe	Included	
3	N	Y	1	Kat		Included
4	N	N	1	Nicole	Included	Included
5	Y	Y	2	Monia	Included	Included
6	N	Y	0	Jeff		Included
7	N	Y	0	Petra		Included
8	N	N	1	Lenny	Included	Included
9	Y	N	2	Gavin	Included	Included

That's great, but what if there are four or five criteria? We may use the '||' operator as an alternative.

We may construct the following formula using the '||' operator instead of the OR function:

=IF([Category 1]="N" || [Category 2]="Y" || [Category 3]>1,"Included",BLANK())



[Included 3 Cr... fx =IF([Category 1]="N" || [Category 2]="Y" || [Category 3]>1,"Included",BLANK())

	Category 1	Category 2	Category 3	Customer Name	Included ...	Included 3 Criteria	Included 3 Criteria ||
1	Y	Y	0	Harry	Included	Included	Included
2	Y	N	1	Joe	Included		
3	N	Y	1	Kat		Included	Included
4	N	N	1	Nicole	Included	Included	Included
5	Y	Y	2	Monia	Included	Included	Included
6	N	Y	0	Jeff		Included	Included
7	N	Y	0	Petra		Included	Included
8	N	N	1	Lenny	Included	Included	Included
9	Y	N	2	Gavin	Included	Included	Included

The '||' operator in the IF formula enables us to combine numerous requirements into a single logical test, greatly easing the expression. When generating custom columns in Power Pivot, the '||' operator is a fantastic method to avoid building unpleasantly nested IF equations.

Grouping and Aggregating Data

Aggregations are a technique of grouping, compressing, or summarizing data. When working with original data through databases or other datasets, the data is often flat, indicating there is still a lot of information but no organization or grouping. Because there are no summaries or organizations, it may be tough to locate trends in the data. Defining aggregations that compress, explain, or summarize trends in response to a particular business query is an essential aspect of data modeling.

Most popular aggregations, such as those that use AVERAGE, COUNT, DISTINCTCOUNT, MAX, MIN, or SUM, may be automatically constructed in a measure using AutoSum. AVERAGEX, COUNTX, COUNTROWS, and SUMX are examples of aggregations that yield a table and need a formula written using Data Analysis Expressions (DAX).

Selecting groups for Aggregation

Whenever you aggregate data, you first group it by criteria like the product, price, location, or date, and then create a formula that applies to all of the data in the group. Whenever you calculate a year's total, for instance, you're doing an aggregate. That's a completely separate form of aggregation if you make a ratio of the current year to the prior year and display it as a proportion.

The business issue drives the choice of how to categorize the data. Aggregations, for instance, can address the following questions:

1. Counts in a month, how many transactions were there?
2. Averages What were the average monthly sales by salesperson?
3. Values at their lowest and highest points What were the top five sales districts in terms of units sold?

To build a computation that addresses these queries, you'll need specific data that includes the numbers to count or total, as well as numeric data that is relevant to the groups you'll use to arrange the findings in some manner.

If your data does not already contain values for grouping, such as a product class or the title of the geographical area where the shop is situated, you may wish to create categories to establish groupings to your data. You should personally input or pick the groups you wish to utilize from among the columns in your Excel spreadsheet when creating groups. In a network of associations, nevertheless, structures such as product categories are often recorded in a database separate from the fact or value table.

A key connects the categorization table to the fact data in most cases. Consider the case when you discover that your data includes product IDs but not product names or classifications. You'd have to duplicate the column with the category names onto a flat Excel spreadsheet to add the category. You may import the product category table into your data model using Power Pivot, construct a link between the table with the numerical data and the product category list, and then categorize data using the categories.

Selecting an Aggregation Function

You must determine the arithmetic operations to utilize for aggregation once you have discovered and added the categories to employ. The phrase aggregation is often used interchangeably with the mathematical or statistical procedures employed in aggregations, such as sums, averages, minimums, or counts. In addition to the conventional aggregations provided in both Power Pivot and Excel, Power Pivot allows you to develop custom aggregation formulae.

Conclusion

This chapter has simply explained the different ways you can transform data using the Power Query. So, with the examples listed out on how you can perform some of the transformation tasks, you can execute a variety of operations based on the report's requirements. You may use it to update numerous choices if you wish to alter data.

If you have data in an improper or unstructured format, you may use the procedures to clean and transform it, as well as execute error management techniques. Many times, we have problems with data generation, which may be resolved with the help of the Power query editor.

CHAPTER SIX

MAKING QUERIES WORK TOGETHER

Layered data analysis is common, with every layer of analysis relying on or elaborating on the prior one. People layer their analysis when they create a pivot table from the output of a Power Query output. This chapter gives an explanation of a few methods in which the user may enhance their data analysis by combining their queries. The Append functionality in Power Query enables you to add data from one query to the outcomes of another query.

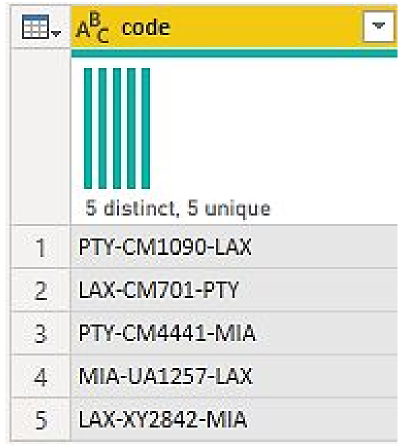
When a user has to combine numerous similar tables into one, the Append function comes in helpful. The user may utilize the Merge functionality in Power Query to combine data from various queries in this chapter. Power Query supports the following types of joins: left outer, right outer, complete outer, inner, left anti, and right anti.

Reusing Query Steps

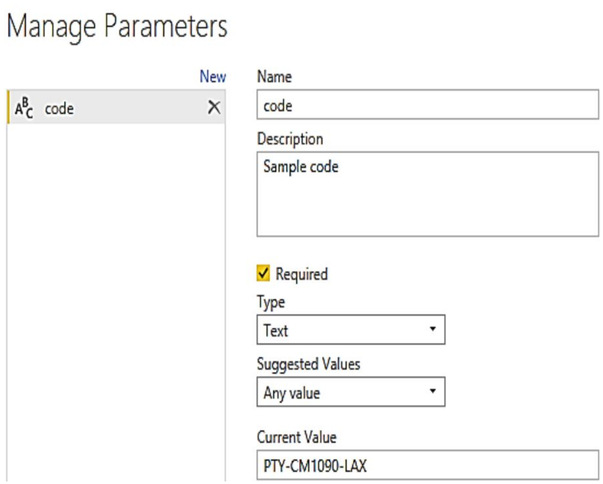
If you often have to perform a similar set of changes to various queries or data, establishing a Power Query custom function that you can reuse as many times as you need might be useful. A Power Query custom function is a binding between a collection of input values and a single output value that is built using native M functions and expressions.

Let's imagine you have a number of queries or data that all need the same changes. You may write a custom function that you could then use against your desired queries or data. This custom function will end up saving you time and allow you to manage all of your conversions in one place, which you can change at any time.

Current queries and parameters may be used to develop bespoke Power Query functions. Consider a query that has numerous codes in the form of a text string, and you want to write a function to decrypt those numbers.



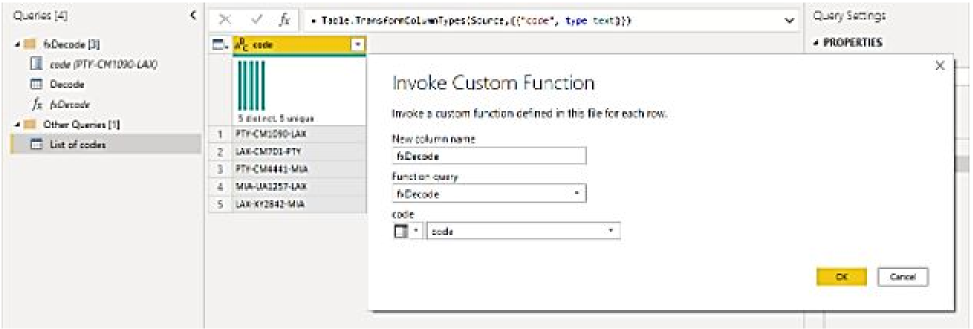
To begin, you'll need a parameter with a value that acts as an example.



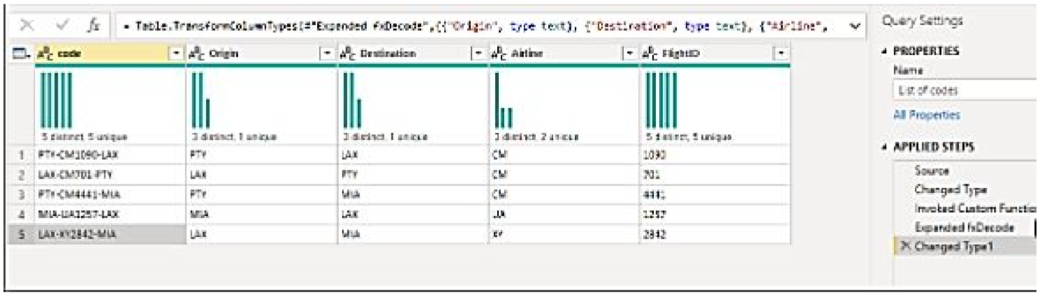
You build a new query based on that parameter and perform the modifications you need. In this scenario, you'll need to break down the code PTY-CM1090-LAX into various parts:

Airline = CM, Origin = PTY, Destination = LAX, and 1090 = Flight ID.

The query may then be turned into a function by right-clicking on it and picking **Create Function**. Lastly, as demonstrated in the figure below, you may call your own function from any of your queries or values.



After a few more changes, you'll see that you've arrived at your expected outcome and used logic from a custom function to achieve it.



Understanding the Append Feature

An append feature generates a new query with all rows from one query accompanied by all rows from another query. At least two queries are required for the append operation. These searches may be based on a variety of other data sources as well.

The add procedure uses the names of the column headers in both tables rather than their relative column positions. All similar columns from all tables are added to the final table. If there are no similar columns in the tables, null hypotheses are inserted into the mismatched column. Beginning with the Main table, the tables will be attached in the sequence in which they were chosen.

There are two sorts of append procedures available. You attach data to your current query until you achieve a final result using an inline append. As a consequence, a new step has been added at the end of the current query. For each append procedure, you construct a new query with an interim append.

Privacy Levels protect users from mistakenly merging data from several data sources, which might be private or organizational. Depending on the query, a user may mistakenly communicate data from a confidential data source to a potentially dangerous data source. Every data source is analyzed and classified into one of three levels of privacy: public, organizational, or private. Adjust privacy levels (Power) for additional details.

Creating the needed base queries

There are various methods to construct and load Power queries into your worksheet using Power Query. In the Query Options box, you can also select default query load parameters.

Hint: Select a cell of data in a spreadsheet to see whether it was molded by Power Query. If the Query context ribbon tab shows, the data was imported from Power Query.

You have the option of creating a query using imported data or a blank query. Making a query using the data you just imported is the most typical method of query creation.

- Import some data.
- Choose Query > Edit after selecting a cell in the data.

Making a query that is completely blank.

You may wish to start from the beginning.

There are two options for doing this.

- Select Data. Choose Get Data and Select **From Other Sources**. Then, click Blank Query.
- Choose Data > Get Data > Launch Power Query Editor.

If you are familiar with the Power Query M formula language, you may manually add steps and formulae at this stage.

You may also choose Home and then command from the New Query group.

Choose one of the options below.

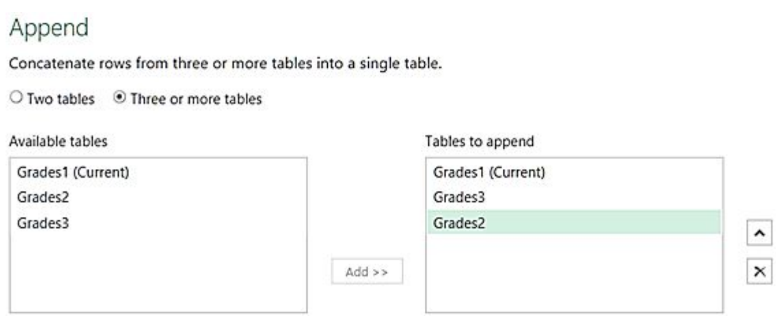
1. To add a data source, choose **New Source**. This command is the same as the Excel ribbon's Data > **Get Data** command.
2. To choose a data source you've been dealing with recently, go to Recent Sources. This command is the same as the Excel ribbon's Data > **Recent Sources** command.
3. To manually input data, choose **Enter Data**. This command may be used to test the Power Query Editor without using an external data source.

Appending the data

To start a query, choose one that has already been loaded from the Power Query Editor, pick a cell in the data, and then go to Query and select Edit.

Choose Append Queries from the Home menu. An inline append is the default action. Choose the arrow next to the command and then Append Queries as New to execute an interim append.

The dialog box for appending displays.



Choose how many tables you'd want to append:

- To append, select Two tables and then the second table from the drop-down list box.
- Three or more tables should be chosen. Add the tables you wish to attach to the Tables to append box from the Available tables box. To modify the sequence, use the arrows on the right of that box.

Choose OK.

Outcome

- A new step in the current query is produced if you decided to conduct an inline ad in step 2. To append new inquiries, keep adding steps to the same query.
- A new query is created if you chose to do an intermediate append in step 2. You can continue to create more queries.

Understanding the Merge Feature

Understanding the Power Query joins

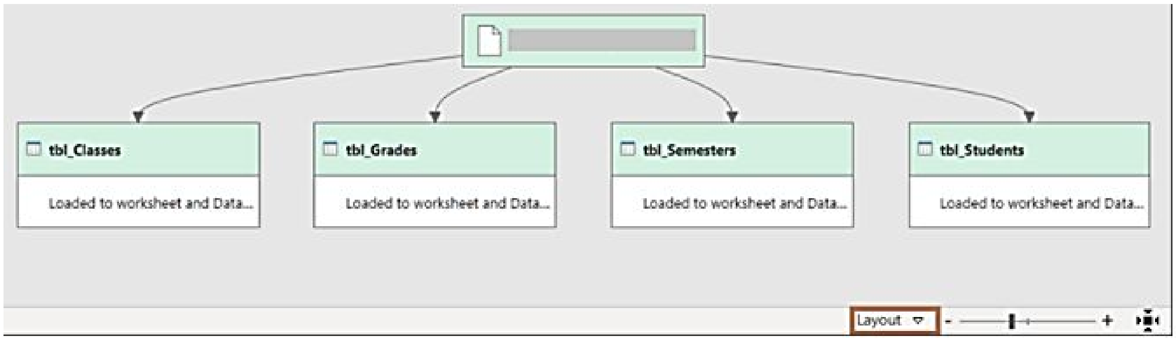
When you combine two queries, you're usually joining them from inside Excel or from an exterior data source. Furthermore, the Merge function features an easy-to-use user interface that allows you to quickly merge two linked tables.

A merge query combines two existing queries to generate a new one. All columns from the main table are included in a single query result, with one column functioning as a single column carrying a connection to a supplementary table. The connected table includes all rows that have a similar column value and match each entry from the main table. A linked table's columns are added to the main table using the Expand procedure.

Merge operations may be divided into two categories:

- **Merge inline:** You keep merging data into your current query until you get a final result. As a consequence, a new step has been added at the end of the current query.
- **Merge in the middle (intermediate):** Each merging action necessitates the creation of a new query.

Choose View. Then, pick Query Dependencies to view a visual depiction of the connections in the Query Dependencies dialog box. To adjust the diagram orientation, pick the Layout command at the bottom of the dialog box.



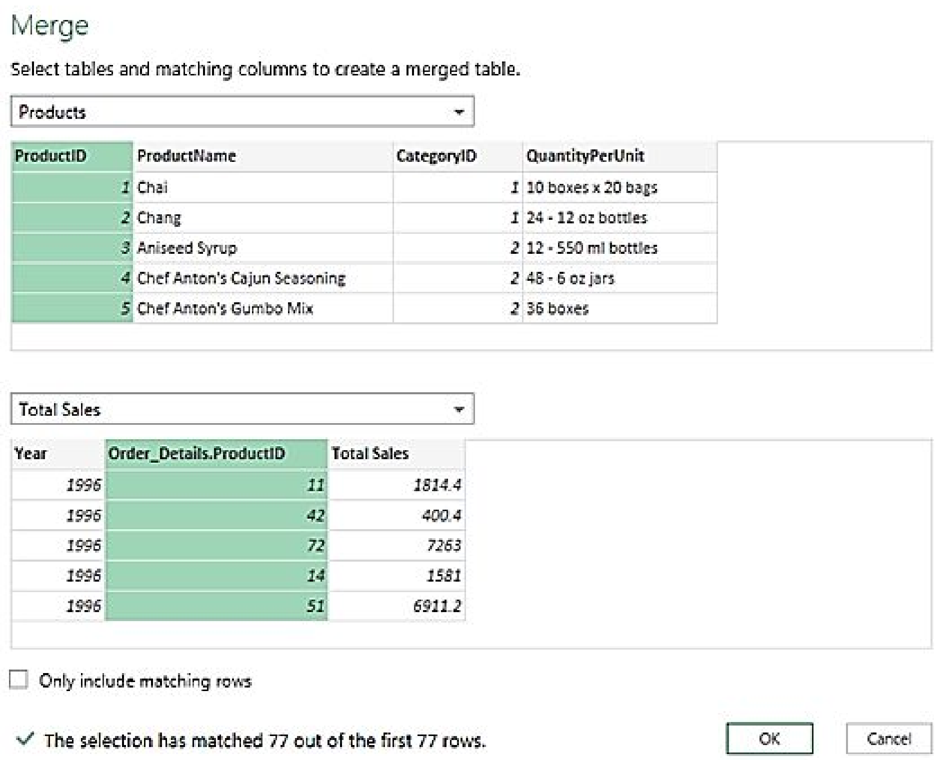
Merging queries

In a joint operation, you'll require at least two queries that can be combined and have at least one or more columns that match. They might originate from a variety of various data sources.

Products and Total Sales are used in the given example.

1. To launch a query, choose one that has already been loaded from the Power Query Editor, pick a cell in the data, and then go to Query > Edit.
2. Choose Home, then Merge Queries from the drop-down menu. An inline merging is the default action. Select the arrow next to the command and then Merging Queries as New to perform an interim merge. The Merge dialog box is displayed on the screen.
3. Choose the main table from the first drop-down menu, then choose a join column by clicking on the column heading.
4. Choose a comparable table from the next drop-down menu, then a matching column by clicking on the column heading.

In the preview of the main and linked or secondary tables, make sure you pick the same amount of columns to match. The order of selection in each table is used to compare columns. The data types of the matching columns must be the same, such as Text or Number. You may also choose to combine several columns.



5. Power Query shows the number of matches from a top group of rows after you choose columns from the main table and associated table. This activity checks to see whether the Merge operation was successful or if any adjustments are required to get the desired outcomes. You may choose from a variety of tables and columns.

6. The default join operation is an inner join.

   However, you may choose from the following sorts of join operations from the Join Kind drop-down list:

- The inner connection Only rows from the main and associated tables that are identical are imported.
- Outer join on the left All rows from the main table are kept, and any matching rows from the associated table are brought in.
- **Outer right join:** All rows from the associated table are kept, and any matching rows from the main table are brought in.
- **Full outer:** All rows from the main and associated tables are imported.

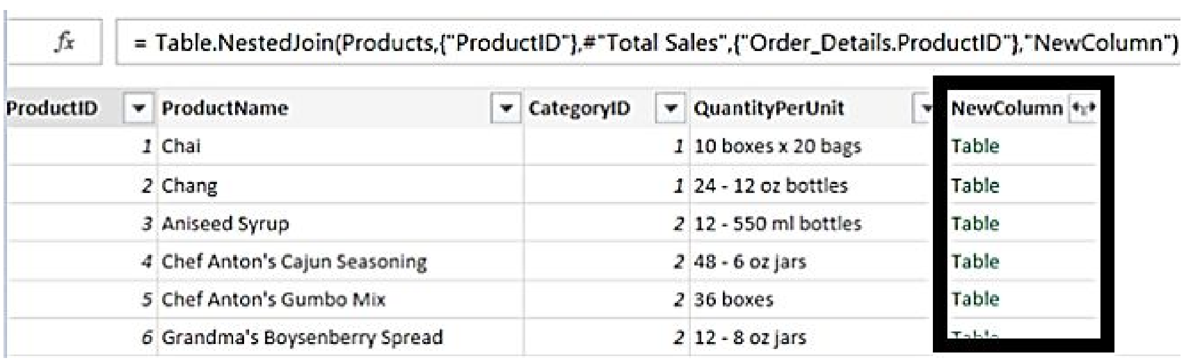
- Anti-join on the left Only rows from the main table with no matching rows from the linked table is imported.

- **Right anti join:** Only rows from the linked table that don't match any entries in the main table are imported.

- Cross-joining By joining each row from the main table with each row from the associated table, the Cartesian product of rows from both tables is returned.

7. Pick Use fuzzy matching to execute the merging and choose from the Fuzzy Matching choices if you wish to do a fuzzy match.
8. Choose Only include matching rows to include only rows from the main table that match the associated table. Alternatively, the resultant query includes all entries from the main table.
9. Choose OK.

Outcome



Conclusion

Finally, merging queries is a significant transformation that improves the performance of our queries and tables for data models. It's critical to comprehend how we'll employ them and how we'll bring them all together as one. We will be able to develop completely optimized queries and tables as a result of this. We can then utilize them in our data model to improve the efficiency of our DAX computations.

CHAPTER SEVEN

ENHANCING POWER QUERY PRODUCTIVITY

This chapter provides helpful hints for arranging queries and getting the most out of Power Query. In addition, the users will get a few tips for improving query speed. Inside the Queries and Connections task pane, you can see all of the Power Query queries in a certain worksheet. The capability to recognize data types instantly and modify data types strategically is one of Power Query's more recent improvements.

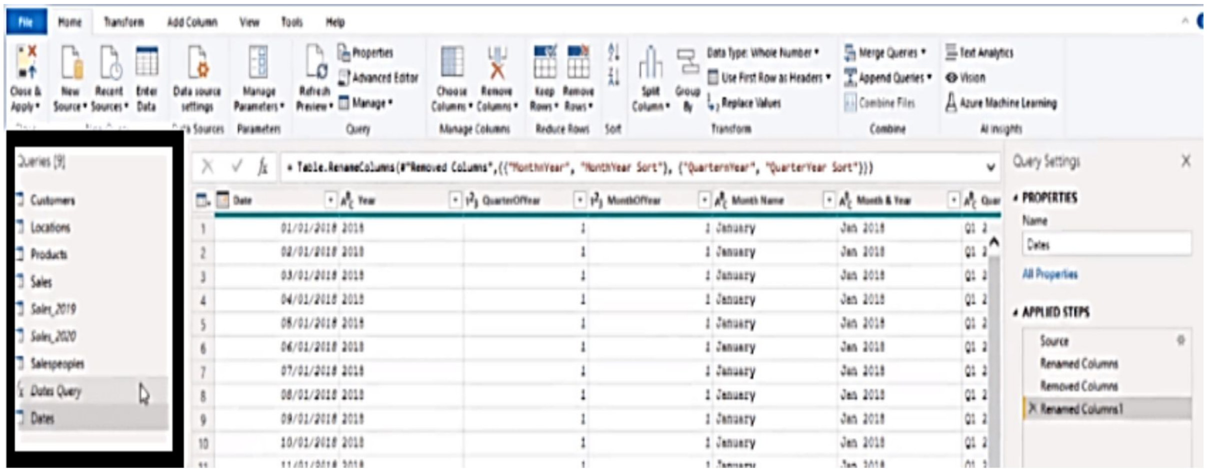
When fresh data is added to the query, this sort of detection is most often used. Although Power Query performs a good job of predicting which data types should be utilized, automated data type changes might create problems. It's impossible to avoid the reality that the greater the data set, the slower the queries will perform. The methods a user may take to improve query performance are discussed in this chapter.

Implementing some Power Query Productivity Tips

Organizing queries in group

Data cleansing is required if you have a huge data collection and a significant number of queries. Some users are unaware of the need for data cleansing in the Query Editor. You may utilize the Transform ribbon's options or just right-click the columns to transform them. To clean up your data, there's no need to apply complex functions. You can quickly comprehend and refer to your columns in your model in this manner. Furthermore, cleansing your data might assist you in subsequently simplifying your visualizations and reports.

Let’s work with the sample below;



To begin cleaning, you must first choose which among them will be contained in the model. Before everything else, that's the first thing I think of.

The setup may include a large number of queries, and not all of them must be included in your model.

Press the Shift button and click the relevant tables to choose the numerous data you wish to add. While picking the proper tables, you may also hold down the Ctrl key.

Afterward, right-click and choose **Move To Group**, then New Group from the menu that appears.

Working to ensure that your queries are well organized, aid in the seamless operation of your Power Query. Maintaining your data tidy and structured will allow your team to work together more effectively. Your data model and reports are simple to grasp for other users.

Selecting columns in your queries faster

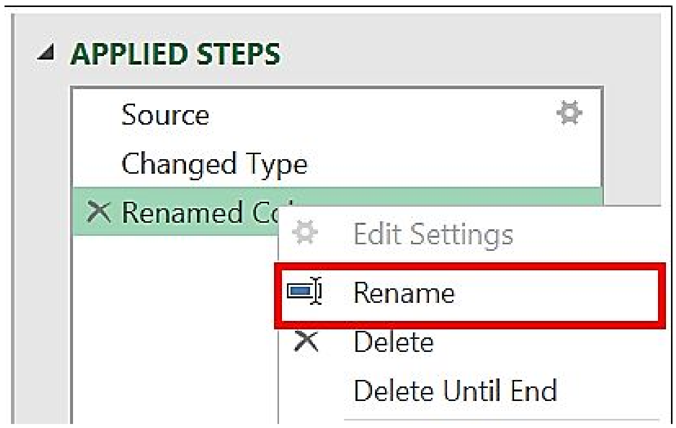
The SQL SELECT command is used to get data from a database table, which is returned as a result table. Result sets are the names for these result tables. The syntax for this is **SELECT column1, column2, columnN FROM table_name**;

The sections of a table containing values you wish to get are column1, column2, ... You may use the below syntax to get a list of all the fields accessible in a field; **SELECT * FROM table_name;**

Renaming query steps

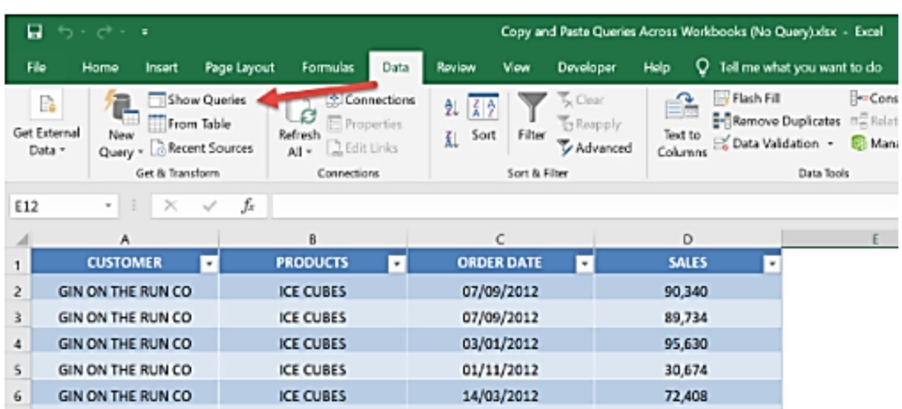
Any data modifications will appear in the Applied Steps list. For example, if you rename the second column, it will appear as Renamed Columns in the Applied Steps list.

Simply right-click on the step that you want to rename and click Rename.

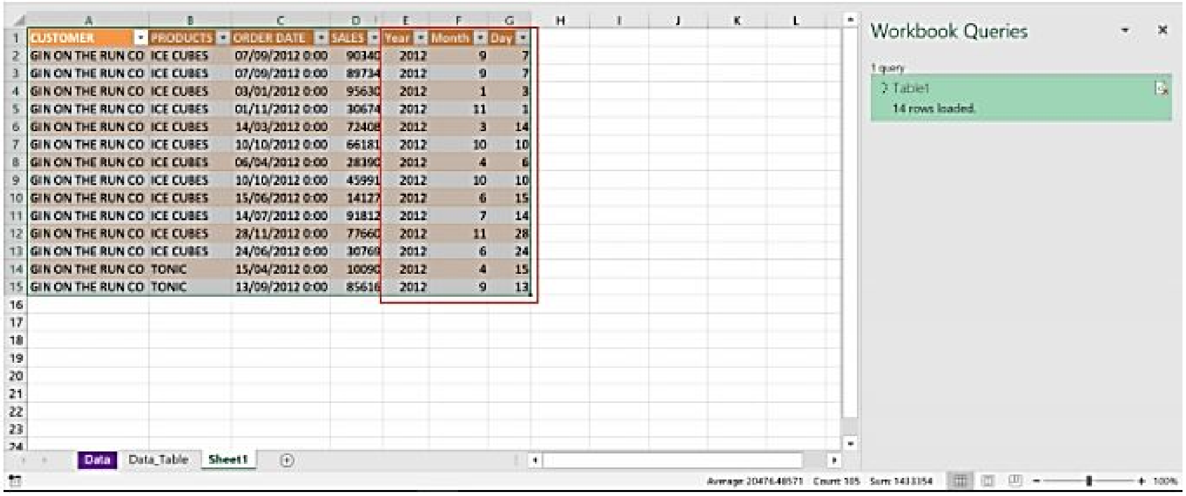


Copying queries to save time

- Start with the existing query in the workbook.
- Select Data, Get & Transform. Then, pick Show Queries from the menu.
- Right-click the Table1 Query in Workbook Queries and select Copy.
- Go to the workbook where this query isn't yet present.
- Select Data > Get & Transform > Show Queries from the drop-down menu.



- Right-click the pane in Workbook Queries and select Paste.
- This table's order date has also been split into Year, Month, and Day!



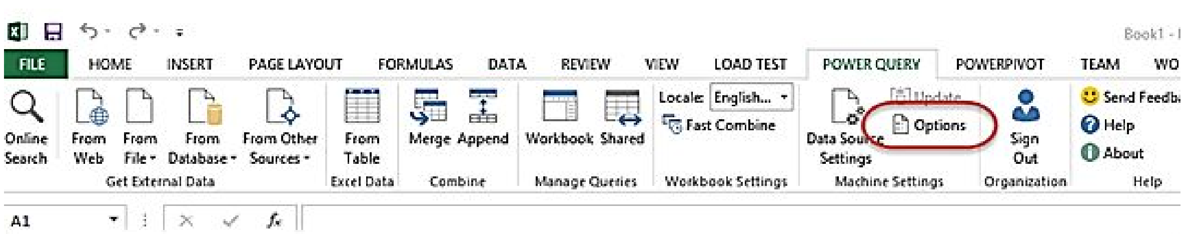
Setting a default load behavior

When loading data from a data source utilizing Power Query, the operator has three options for storing the data. It may be entered into a workbook spreadsheet, a data model, or perhaps both. When just one table is being imported, the default behavior (and hence the one that will be used most often) is to load into a worksheet; when many tables are specified, the default behavior is to load into the data model.

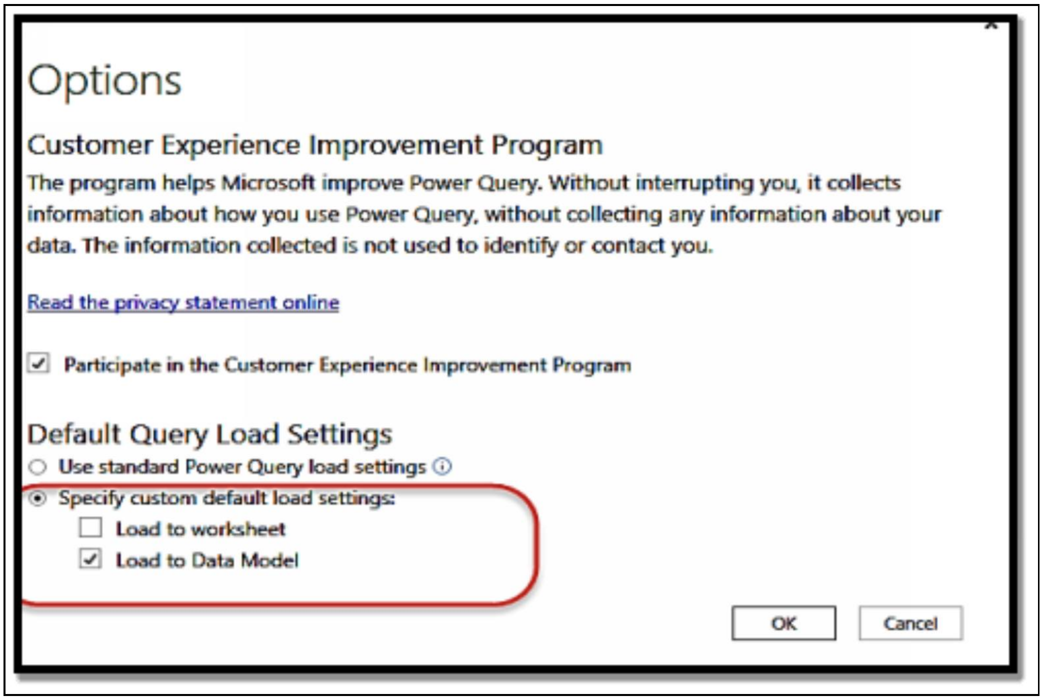
Average users will anticipate viewing the data instantly when it is imported, thus the load to spreadsheet default is sensible. They won't want to launch the PowerPivot model editor. Nevertheless, uploading to the worksheet has a number of drawbacks.

The million-row limitation in Excel, the aspect that data is kept in the model considerably more effectively, and the data size constraints when dealing with Power Pivot are the most common limitations.

Because the defaults are Power Query-wide, they're in the Power Query options. Go to the Power Query tab and choose the Options option once Excel is opened.

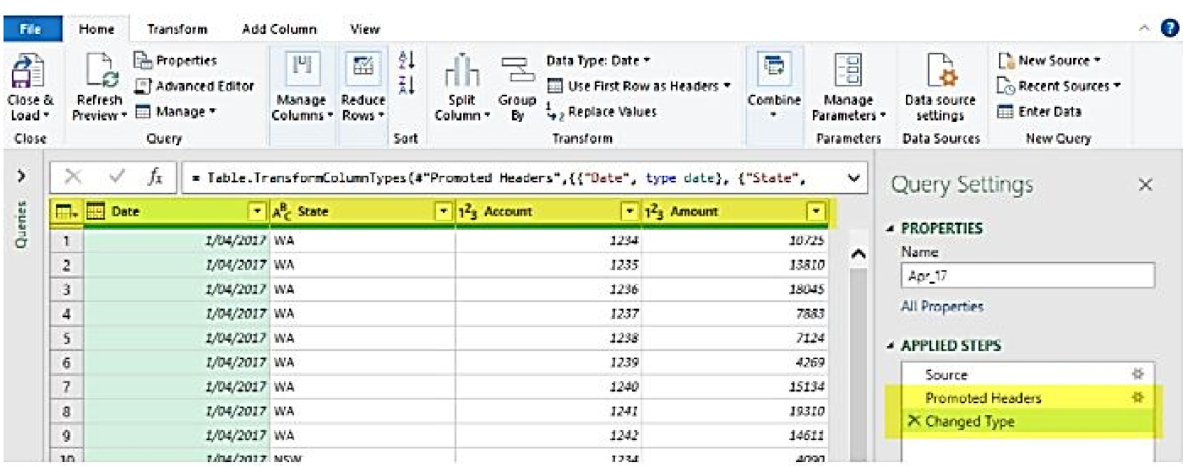


You may now customize your data load settings in addition to joining the Customer Experience Program. I always import solely to the model; therefore, I choose Custom and Load to Data Model from the drop-down menu.



Preventing automatic data types changes

Whenever you utilize Power Query to convert data, it will typically boost the headers (use first rows headers) and estimate the data types for each column. You can stop it from doing so. When bringing in structured data, the layout makes it easy to determine the headers and data kinds.



The two yellow-highlighted steps on the right have been dynamically put into the Query. The X to the left of each stage may be used to erase it.

The headers have been promoted, which indicates that the names in the first row of the data have been elevated to column headers.

Date, Text, Integer, and Integer have also been set as column data types

You might not let that happen, and there is an option you can alter to prevent it from occurring automatically - see the Settings section below for more information.

The column headings may need to be manually entered on occasion. This happens when the first row has a variable entry, such as a date.

The data type for each column is approximated depending on the values of that column in the Changed Type stage.

Types of Data

The column data types might affect your transformations while conducting more complicated work in Power Query. For example, if you're conducting date calculations using a column, you'll require a Date data type.

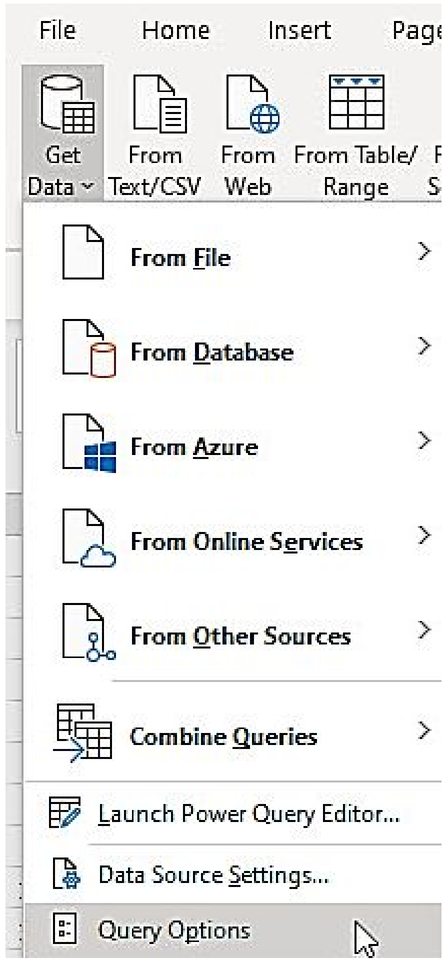
In certain circumstances, explicitly setting your column data types is preferable to relying on Power Query to estimate them properly.

Settings

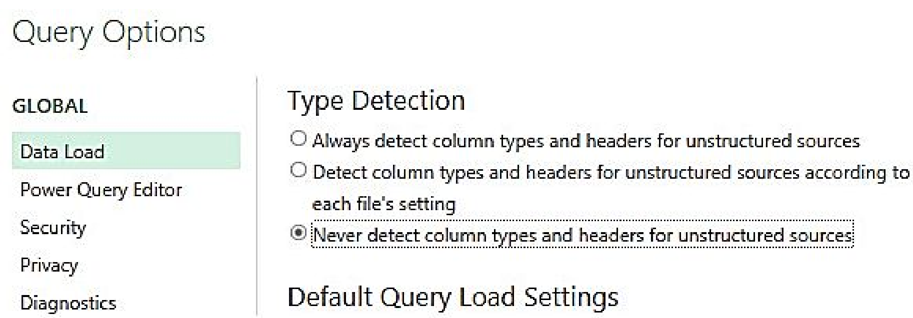
You may disable the two stages marked in yellow in the figure above by changing a global option.

After you change this parameter, it will affect any Power Queries you make.

Select the Get Data to drop down on the Data ribbon tab, then Query Options at the base.



Choose the **Never detect column**... option in the Global Data Load Type Detection menu and select OK.



The Promote Headers and Changed Type steps would no more be applied automatically.

The Changed Type step will not be introduced if you promote the headers manually using the Use First Row as Headers icon.

Avoiding Power Query Performance Issues

There are performance difficulties when there are too many variables or steps. Power Query allocates RAM for each variable, resulting in a considerable increase in memory use. It also takes a long time for the CPU to process so many variables using the Power Query Engine. In the vast majority of situations, your variables are databases with numerous rows and columns of data. Therefore, even with hundreds of steps or variables, this may occur in an actual situation for you. So, you must keep an eye on the number of variables.

If the problem is caused by a large number of variables, the solution is to reduce the number of variables. With fewer than a hundred variables, performance concerns are uncommon; however, as the number exceeds that, the problem becomes apparent. One thing to keep in mind is that combining variables makes debugging, troubleshooting, and maintaining the code more difficult. As a result, only utilize this approach if absolutely necessary.

Using views instead of tables

A database view is nothing more than a saved query over database data. This saved query can be used to query tables as well as other views (you can create a view that queries other views). Although this saved query (view definition) is big data of the database, it does not contain any physical data!

The first significant distinction between a "normal" table and a view is that views do not save data. This implies that whenever you require data from a view, the underlying stored query must be conducted against the database. Because views are executed every time you "call" them, they always will select the appropriate data from the fundamental tables. That implies you don't have to worry whether the underlying table has changed (deleted/updated rows) since you'll always obtain the real data from the tables.

Benefits of Using Views

Views have numerous benefits over regular tables under certain circumstances:

- Views can (and often do) contain joins between multiple tables, resulting in a single result set and thus reducing complexity.
- Utilizing aggregate functions like SUM, AVG, COUNT, and others, you may pre-aggregate data for your analytic operations using views.
- Views may be used to restrict access to underlying data: for example, you might construct a view that only includes sales for the United States, and then provide appropriate people access to that view. As you may limit access to a table while providing access to a view-only, you're not revealing all of the data from the database.
- Views take up no space in your database (except for a little amount of RAM used to store query definitions) – and don't forget, views don't store real data!

Your basic model should be concerned with data storage and retrieval efficiency. By enabling you to isolate the complications that result from an efficient, normalized model, views are partially a tool that negates such difficulties.

Furthermore, comparing "what are the benefits of utilizing a view versus a table?" is not a good contrast. It's impossible to live without tables, but it's possible to live without vistas. They're all there for various reasons. Tables are the actual model, whereas Views are an abstracted version of the concrete model.

Disabling privacy settings to improve performance

To ensure that sensitive data is only accessed by authorized individuals, privacy settings must be configured appropriately. Moreover, data sources must be segregated from one another so that merging data has no negative influence on data transport. If privacy settings are established improperly, critical information may be exposed outside of a secure facility. Knowing and understanding the privacy settings is important and ensuring that they are set to the proper level for your requirements.

However, a stringent isolation level prevents data from being shared across data sources, it may decrease functionality and have a negative effect on performance.

1. Choose File. Click Options and Settings, then pick Data Source Settings in the Power Query Editor.
2. Choose Edit Permissions from the drop-down menu. The dialog window for Editing Permissions displays.
3. **Choose an option from the drop-down list underneath Privacy Level:**
    - **None**: There are no privacy options available. Set this parameter with caution. Ensure that privacy rules are followed in all other ways. In a controlled development environment, you might utilize this privacy option for testing and performance purposes.
    - **Private**: The accessibility of the data source may be limited to authorized users if it contains sensitive or secret information. It's absolutely separate from the rest of the data. Facebook data, a text file detailing stock awards, or a worksheet holding an employee evaluation are all examples.
    - **Organizational**: Restricts access to a data source to a certain set of persons. It is hidden from all public data sources; however, it may be seen by other Organizational data sources. A Microsoft Word document on an intranet SharePoint site with permissions set for a trusted group is a frequent example.
    - **Public**: Ensures that everyone has access to the data. The public may only be applied to files, online data sources, or workbook data. Data from a Wikipedia article or a local file containing data taken from a public web page are two examples.
4. Choose **OK**.

Avoiding data transfer by negligence

Privacy Degrees may help you avoid merging data from numerous data sources that are configured to distinct levels of privacy, such as private and organizational. Based on the query, you can unintentionally transfer data from the private data source to a data source that isn't in a trusted scope. Power Query examines each data source and categorizes it as Public, Organizational, or Private, depending on the degree of privacy specified. If there is undesired data transmission, this analysis guarantees that data is not merged. When a query employs a method called query folding, this data protection mechanism might also occur.

Conclusion

The productivity of your Power Query matters a lot. When the productivity is good, the rate of your work will be very fast and neat. So, the tips explained here will go a long way in helping you achieve that.

CHAPTER EIGHT

TEN TIPS FOR WORKING WITH POWER QUERY

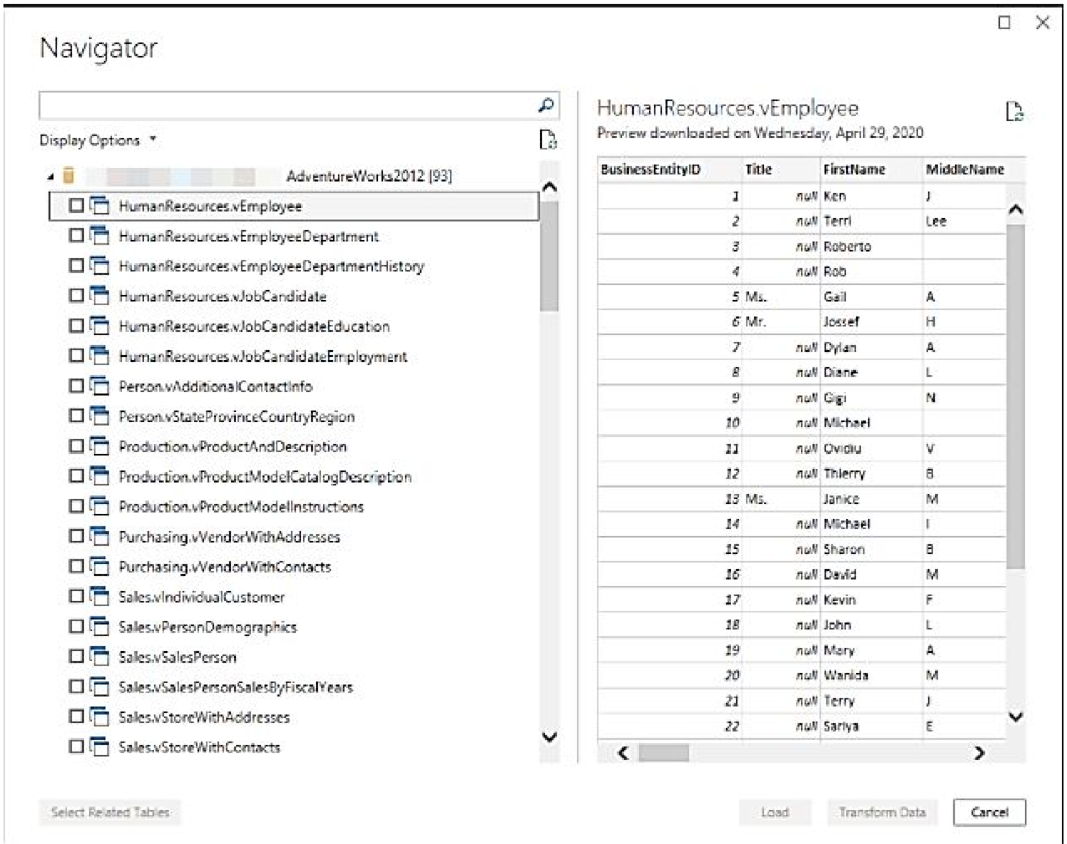
This chapter emphasizes the Get and Transform (Power Query) capability in Excel. It illustrates how to use the Microsoft Office Excel Power Pivot feature to increase productivity and incorporate knowledge in a spreadsheet. The overall aim is to increase general accounting department efficiency. This chapter focuses on Excel's time-saving features and approaches. In this case study, Excel Get and Transform, Power Pivot, big data, and working capital are all woven into one mosaics.

Select the appropriate connection.

A large variety of data connections are available in Power Query. Data sources such as TXT, CSV, and Excel files, as well as databases like Microsoft SQL Server and prominent SaaS services like Microsoft Dynamics 365 and Salesforce, are all supported by these connections. If your data source isn't shown in the Get Databox, you may always connect to it using the ODBC or OLEDB connection.

You will have the greatest abilities and competencies if you use the right connection for the job. When connecting to a SQL Server database, for instance, utilizing the SQL Server connector rather than the ODBC connector not only delivers a far better Get Data experience, but it also enables capabilities that may enhance your experience and outcomes, such as query folding.

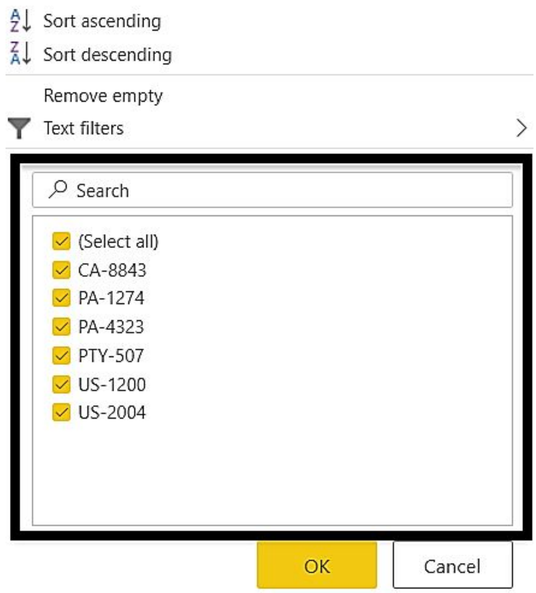
Each data connection has a consistent user interface. Data Preview is a step in this standardized experience. If the connection supports it, you'll be given a user-friendly interface to pick the data you wish to retrieve from your data source, as well as a rudimentary data preview of that data. You may also use the Navigator window to choose several datasets from your data source, as seen in the figure below.



Filtering early.

Filtering your data at the start of your query, or as soon as feasible, is always a good idea. Some connections will use query folding to make use of your filters. Filtering away any evidence that isn't related to your case is also a good idea. By just displaying data that is important in the data preview area, you will be able to concentrate on the work at hand.

You may pick the values you wish to retain or filter out using the auto filter option, which provides a separate list of the values detected in your column. You may also search for values in your column using the search bar.



Performing hard operations last

Some procedures need reading the whole data source in order to produce any results, therefore previewing them in the Power Query Editor will be sluggish. If you sort your data, for instance, the first few sorted rows maybe toward the end of the original data. As a consequence, before the sort operation can produce any results, it must first read all of the rows.

Other processes, such as filters, do not need to read all of the data before delivering any outcomes. Rather, they use a technique known as "streaming" to work with the data. The data "streams" by, with results being returned as it goes. Such procedures in the Power Query Editor just require reading enough of the source data to fill the preview.

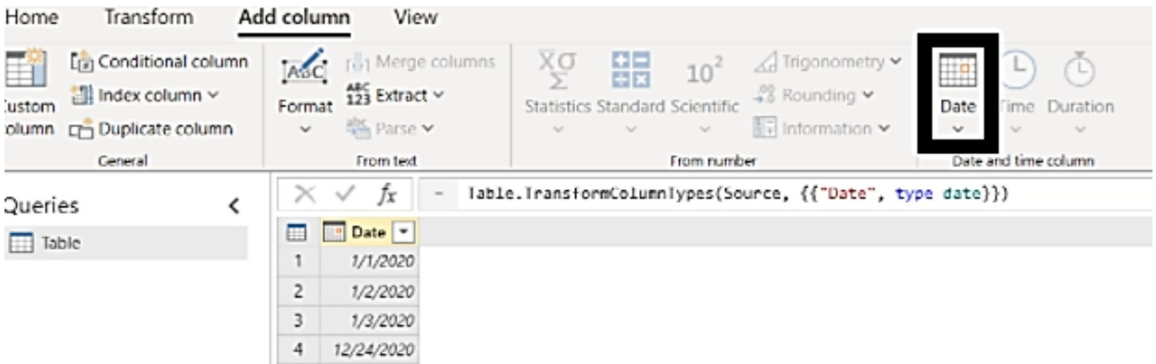
Execute such streaming activities first, and any more costly processes last, if at all practicable. It will assist you to spend less time waiting for the preview to render every time you create a new step to your query.

Working on a portion of your data for the time being.

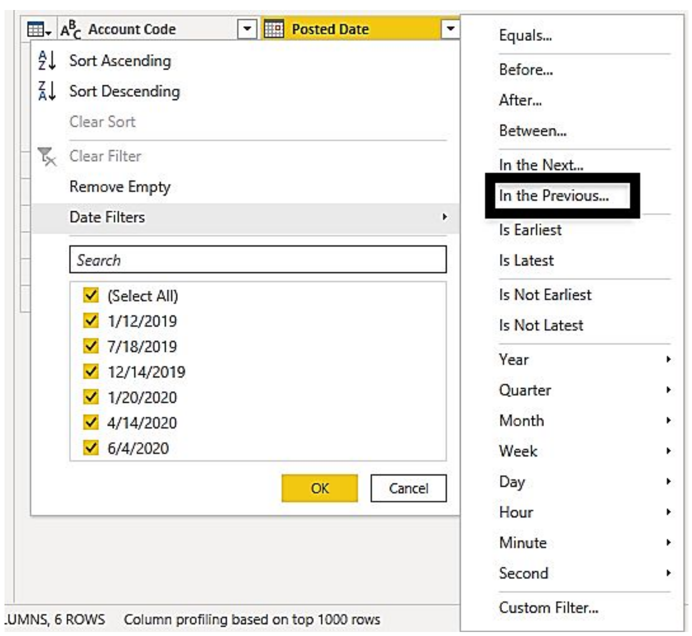
If adding additional steps to your query in the Power Query Editor is taking too long, try conducting a "Keep First Rows" action first to reduce the number of rows you're dealing with. After that, delete the "Keep First Rows" step after you've added all the steps you need.

Making use of the appropriate data types

Some Power Query functionalities are dependent on the data type of the column specified. When choosing a date column, for instance, the Add Column menu will display the possible choices under the Date and time column group. These choices will be totally wiped out if the column does not have a data type selected.



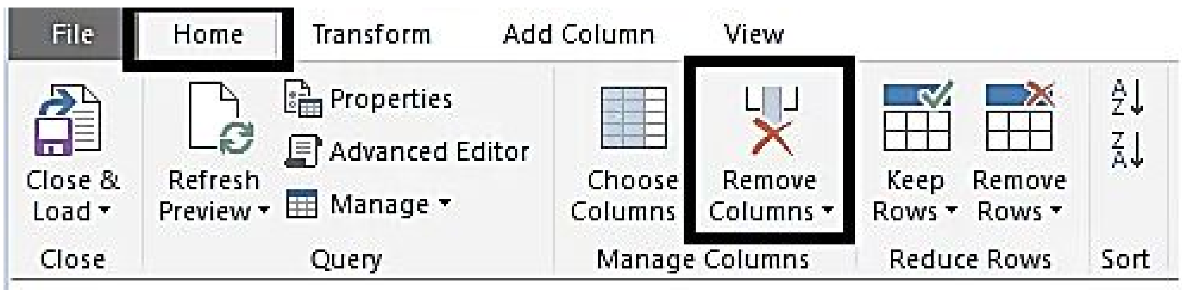
Because type-specific filters are particular toward certain data types, they're in a similar scenario. These type-specific filters will not be provided if your column does not have the relevant data type declared.



It's important that you use the right data types for your columns at all times. When dealing with organized data sources like databases, the data type information is pulled from the database's table schema. However, when working with unorganized data sources like TXT and CSV files, it's critical to use suitable data types for the columns that come from that data source. For unstructured data sources, Power Query provides automated data type recognition by default.

Moving or deleting columns to reorganize data.

It's possible that your data is precisely what you want it to be, except for one little element. It has columns you don't require or the columns aren't in the order you want to see them. Decluttering and arranging your data is a simple thing that allows you to concentrate on the essential things. When using Power Query to import data, this is a simple remedy.



Delete any column from the data by going to the Home tab in the query editor ribbon and selecting the Remove Columns command, then selecting Remove Columns from the menu. You may also remove a column by right-clicking on it and choosing Remove.

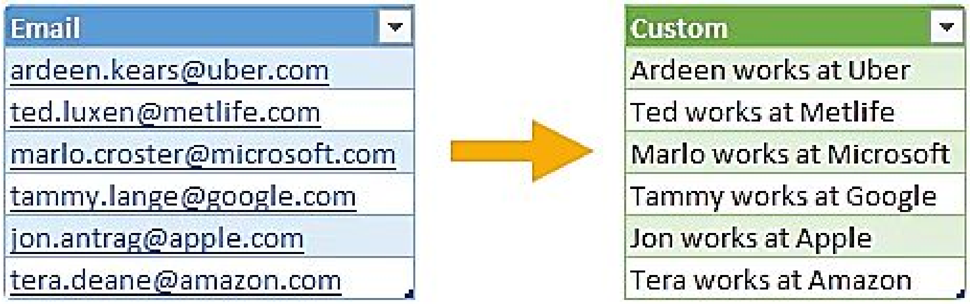
Hint: Do the column titles you wish to delete alter from time to time? Therefore, rather than using the Remove Other Columns command, choose the columns you wish to maintain. The query will only refer to the columns you wish to preserve and will not throw any problems if the names of the columns you removed change the next time you import data.

It's also simple to move columns. Simply left-click on the column header and drag it left or right to the new spot.

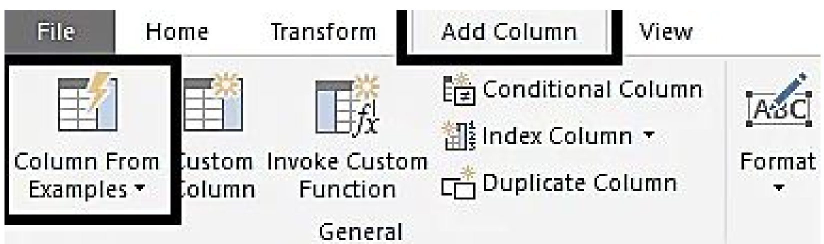
Creating a column based on examples

Making new columns related to existing columns in your data is a typical occurrence.

In this case, you have quite a list of email addresses and want to add a new column to each row that includes text such as "Ardeen works at Uber" and so on.



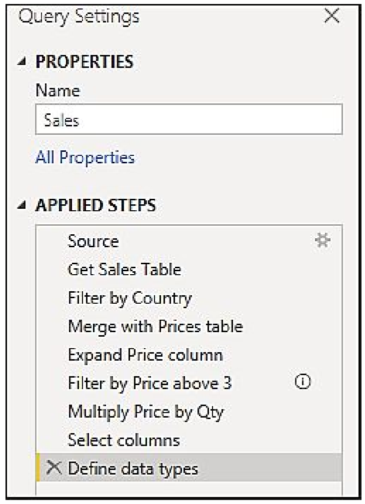
You must extract the first name and firm from the email address and combine them while capitalizing the names and companies. To get the output, you'd have to use a couple of different transformation processes in Power Query. This implies determining which sequence of actions will result in the desired outcome. Based on a few of the samples you offer, Power Query can really find out how to modify the data.



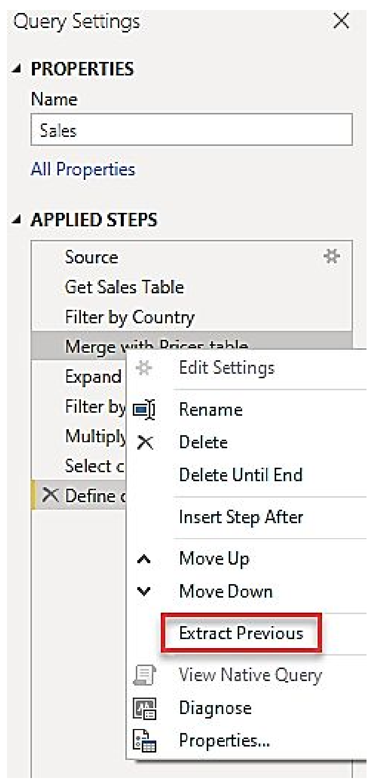
Utilize a modular strategy.

It is totally feasible to write a single query that incorporates all of the necessary conversions and computations. However, if the query has a lot of stages, it's a good idea to break it up into numerous inquiries, each of which refers to the previous one. The purpose of this method is to isolate and simplify transformation processes so that they are easy to comprehend.

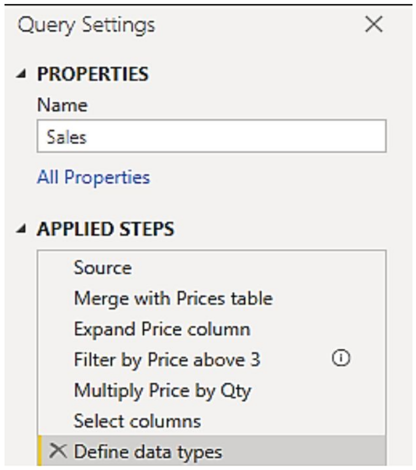
Assume you have a question with the nine stages shown in the figure below.



At the Merge with Prices table phase, you might separate this query into two. In that manner, the processes that were performed to the sales query prior to the combine are clearer to comprehend. To do so, right-click the Merge with Prices table step and choose Extract Previous from the menu.



After that, you'll be asked to name your new query in a dialog box. Your query will be essentially divided into two queries as a result of this. Just before merging, all of the queries will be combined into one query. The second query will include an essential step that references your new query, as well as the remainder of the stages from the Merge with Prices table step downward which you had in your initial query.



You may also take advantage of query referencing if that's what you want to do. However, it's a great way of keeping your inquiries at a scale that doesn't appear too complicated at first look.

Future-proofing queries

A primary concern is to make sure you build a query that won't cause any problems at a subsequent refresh. Power Query has a number of capabilities that make your query more resistant to modifications and able to refresh even if certain elements of your data source change.

It's a good idea to describe the context of your query in regards to what it should perform and what it should provide for in terms of its structure, layout, column names, data types, and any other relevant components.

The following are some examples of modifications that might help you to make your query more adaptable to changes:

1. Use the Remove bottom rows feature if your query includes a variable number of rows containing data but a set number of rows that act as the footer that should be eliminated.
2. Use the Choose columns feature if your query contains a variable number of columns but you just need to choose a few from your dataset.

3. You may use the unpivot just chosen columns functionality if your query has a large number of columns and you only need to unpivot a subset of them.
4. You might eliminate the rows that gave error values if your query involves a step that changes the data type of a column, but certain cells return errors because the values don't comply with the required data type.

Making functions that may be reused.

If you often need to apply the same set of changes to various queries or data, establishing a Power Query custom function that you can reuse as many times as you need might be useful. A Power Query custom function is a mapping between a collection of input values and a single output value that is built using native M functions and operators.

Let's imagine you have a number of queries or data that all need the same changes. You may write a custom function that you could then use against your desired queries or data. This custom function will save you time and allow you to manage all of your conversions in one place, which you can change at any time.

Existing queries and parameters may be used to develop bespoke Power Query functions. Consider a query that has numerous codes in the form of a text string, and you want to write a function to decrypt those values.

Conclusion

So, this chapter listed and explained the tips on Power Query that you can use to boost its productivity. Ensure that you make use of the tips here for it will save you lots of time and energy.

BOOK 5

EXCEL DATA ANALYSIS

CHAPTER ONE

LEARNING BASIC DATA-ANALYSIS

Excel is a sophisticated, user-friendly tool that has revolutionized the way analysts and businesses approach data analysis in a variety of sectors. Excel has been the most popular and commonly used data analysis tool since its introduction.

The application can do both simple and complicated data analysis procedures. Monetary forecasting, company development, human resource, and external planning are just a few of the activities that analysts utilize across a wide range of sectors and use cases.

Having a strong working grasp of Excel can only enhance your abilities. Users may complete a broad variety of tasks using it. Its methods, representations, and collections let the user rapidly and properly examine data without having to do repeated labor.

What is Data Analysis Anyway?

Data analysis often referred to as data analytics, is a method for cleaning, analyzing, changing, and modeling data. Data analysis makes it simple to locate and comprehend new information, come up with reliable results, update and arrange data effectively, and validate a certain statement procedure.

Though data is critical and the universe has grown more computation, data in its basic form is insufficient. Data must be reviewed, cleaned, and changed before it can be used to provide actionable insight. Data analysis is a term used to describe this kind of procedure.

There is no one-size-fits-all solution. Data analysis may be done in a number of ways. These many approaches to data analysis are employed in a variety of sectors, including commerce, sciences, as well as the disciplines such as sociology. Data analysis is, in reality, something that the modern corporate world lives on. To fuel corporate development, data analysis is used to gain business insight.

Data mining is similar to data analysis in that it focuses on uncovering new information for forecast instead of explanatory reasons. Data analysis may be divided into descriptive statistics, exploratory data analysis (EDA), and confirmatory data analysis in statistical applications (CDA).

CDA aims to validate or disprove current assumptions, while EDA focuses on detecting new characteristics in the data.

Predictive analytics is the process of using statistical models to make predictions or classify data. Text analytics uses statistical, linguistic, and structural tools to collect and categorize knowledge from textual sources.

These are examples of data analysis. Due to doing data analysis, data integration is required. Visual analytics and data distribution are both linked to data analysis. The words data analysis and data modeling are sometimes used alternatively.

Performing appropriate data analysis has numerous aspects. Analysts can easily achieve all of this using Excel. Below are just a few of the many capabilities Excel has for data analysis:

Sorting

Excel can easily sort data based on one or more parameters. Users may sort data in either descending or ascending order, depending on their requirements. Users may sort lists alphabetically or have descriptive statistics ranked from lowest to highest, or conversely.

Filtering

This is another kind of data analysis that Excel may conduct alongside sorting. In Excel, users may divide data into sections and display just the data points that meet their requirements. This is a fantastic option for narrowing down data, ensuring that it meets specified criteria, or seeing just a subset of cells. All of this is performed while the actual data is preserved. Based on the filter used by the user, the viewable data changes. It is a realistic method of examining a dataset.

Conditional Formatting

Conditional formatting enables the user to emphasize cells in a certain color dependent on the value of the cell and the conditions set by the user. It's a great technique to graphically showcase data or detect outliers and patterns in data.

Charting

While Excel can quickly edit data sets, it can also generate charts to make data analysis results easier to understand. Excel charts are user-friendly and make the data easy to interpret because of their color, simplicity, and versatility. Excel charting is a basic and straightforward approach to making your data analysis more understandable to others. In projects and discussions, Excel charts are useful for delivering crucial conclusions from data research.

Tables

The table command converts data into a structured table that may be sorted and filtered for simple organizing and display.

Pivot Tables

This Excel function allows you to manipulate and analyze big organized data sets interactively. Pivot tables can extract vital insight from big, comprehensive data sets and condense it. A spreadsheet describes, sorts, reassembles, classifies, tallies, totals, or balances the data. It allows users to effortlessly evaluate enormous data sets in Excel, even those containing hundreds of millions of data points.

What-If Analysis

Users may use Excel to create scenarios of theoretical events in order to see how autonomous factors affect two variables. "What would sales be like if the firm opened two more retail outlets next year?" for instance. Situations, Goal Seek, and Data Tables are the three kinds of What-If Analysis tools available in Excel. Scenarios enable you to think about a variety of circumstances. Data Tables will reveal the influence of one or two variables on a given calculation, while Goal Seek will assist you in achieving your desired outcome. All of them enable the user to edit data and execute simulations of hypothetical situations.

Solver

This is a Microsoft add-in that may also be used for What-If scenarios. Depending on your specified restrictions or limits, it may discover the ideal (both minimum and maximum) result for an ideal cell (one containing a formula). Solver discovers the best solutions to decision issues, allowing the data to be used more effectively. For instance, a company may utilize a solver to determine the best marketing strategy for an e-commerce store based on the market and operating margins for every product.

Analysis Toolkits

You may use this Excel add-in to assist you with difficult analytical, commercial, and mechanical analysis. It comprises statistical tests like ANOVA, t-Test, and z-Test, as well as regression, sampling, and Fourier processing methods for solving complex systems issues.

Descriptive Statistics

Descriptive statistics is one of the Excel Tool Pak add-ins that permits you to avoid doing separate statistical analyses for regularly used statistics like mean, mode, and standard deviations. As a result, the user may get statistical statistics for their data collection with only one click of a button.

Cooking raw data

There are different things you need to follow whenever you are working on raw data. These steps will guide you through. Below are the steps;

Data Collection: The first stage in doing data analysis is to gather data on the variables in an organized manner. This kind of procedure will assist us in determining the answers to critical questions and evaluating the outcomes. The data-gathering phase is critical because it assures the validity of the data, allowing legitimate choices to be made based on it.

Data collecting is also beneficial since it provides a baseline against which you can assess progress and a goal to strive towards. In terms of Excel, you may gather and import data from a variety of different sources.

Cleaning of data

Finding and repairing flaws in a dataset is the goal of data cleaning. It also entails replacing any components that are missing or incorrect with the proper ones.

The approaches listed below may be used to clean data in Excel:

1. Getting rid of redundant values
2. Eliminating blank spaces
3. Combining and dividing columns
4. Joining or matching table data to reconcile it

1. Getting rid of redundant rows:

Once you have a lot of data, it's probable that some rows may be duplicated. Before removing duplicate values, it's a good idea to filter for distinct values first to ensure that the results are what you want. Thankfully, Excel has a built-in tool for removing duplicate data from a table. It allows you to eliminate duplicate values from a table depending on the columns you choose.

2. **Eliminating Blank Spaces**:

It's conceivable that your Excel data includes preceding, ending, or numerous inserted space letters. Whenever you sort, filter, or search with these characters, you may get surprising results. You may, however, utilize Microsoft Excel's Trim function to eliminate all spaces from the text but apart from singular spaces between words.

3. Combining and dividing columns

Merging or splitting two or more columns into one, or splitting one column into two or more columns, is popular in Excel. For example, you could wish to break an address column into distinct columns for street, city, region, and postal code.

4. Joining or matching table data to reconcile it

When two or more tables are connected, Excel may also be used to discover and repair matching mistakes. It's possible that you'll have to reconcile two tables from distinct workbooks. It may be used to view all entries in both tables or to compare tables and detect rows that don't match, for example. The method **Vlookup()** will assist you in completing this operation. **Vlookup()** searches the first column of a table array for a value and returns a value from another column in the table array in the same row.

Exploration of Data Using Pivot Tables

Data Exploration is the process of using statistical information and visualizations to undertake preliminary studies on data in order to uncover patterns, anomalies, test hypotheses, and verify hypotheses.

Why does it worth so much? Because you can utilize data exploration to make sense of what you have. You may then choose what queries you want to ask and how to phrase them, and also how to effectively modify your data sources to get the information you want.

Visualization of Data:

Given the importance of data exploration, data visualization as a tool for doing so becomes more relevant. The presenting of data in a pictorial or graphical style is known as data visualization. The importance of such a graphical style is that it allows decision-makers to view analytics displayed graphically. In other words, they have a far easier time grasping complex topics or recognizing new patterns. The most common capabilities for data visualization in Excel are charts and pivot charts (Charts and Pivot Charts).

Dealing with data

You may be curious about how data analysis operates. There are ways you deal with data in the data analysis process. For your convenience, here is a step-by-step breakdown of the process of data analysis:

Defining Requirements for Data

It is critical to identify the data needs from the start in order to do a successful data analysis. Let's pretend the information is about the population. If that's the case, certain factors like age, income, and so on must be stated and retrieved. The information gathered might be numerical or categorical.

Data Gathering

After the variables have been defined, the data for the variables must be gathered. It may be gathered from a variety of places and made accessible for processing. In its current state, this data may not include any useful information. As a result, it must be treated and cleaned.

Processing of Data

The information gathered must be arranged in order to be analyzed further. This would include reorganizing the data in a certain manner so that it can be used by different analytic tools. For example, you may need to arrange the data in a table with rows and columns for further analysis in a Spreadsheet or Statistical Application. It's possible that you'll need to construct a data model as well.

Cleaning of data

While the information may be structured, it may also be lacking. It's still possible that some of the products are duplicates. There's a chance you'll make a few mistakes. Data cleaning is a method of correcting these inaccuracies and ensuring that the data is accurate. Cleaning the data may be done in a variety of ways. If it involves financial information, totals will almost certainly be included. These totals may then be compared to real-world public data or other variables. The data may be cleansed in this manner.

Analyzing the data

Data is available for analysis after it has gone through different steps such as processing and cleansing. Data analysis may be done using a variety of methods. Data visualization may also be used to visualize data in a visual way. Data analysis may also be done using well-known forecasting methods such as correlation or regression analysis.

Communication

While data analysis may seem to be the last phase in the process, the results must be delivered to the end-users in a systematic manner. The results may be required in a certain format by the end-users. Some data visualization approaches, such as tables and charts, may be quite effective in this situation since they can express the idea quickly. Color coding and other techniques may assist you to make it easier to understand and convey your results.

Building data models

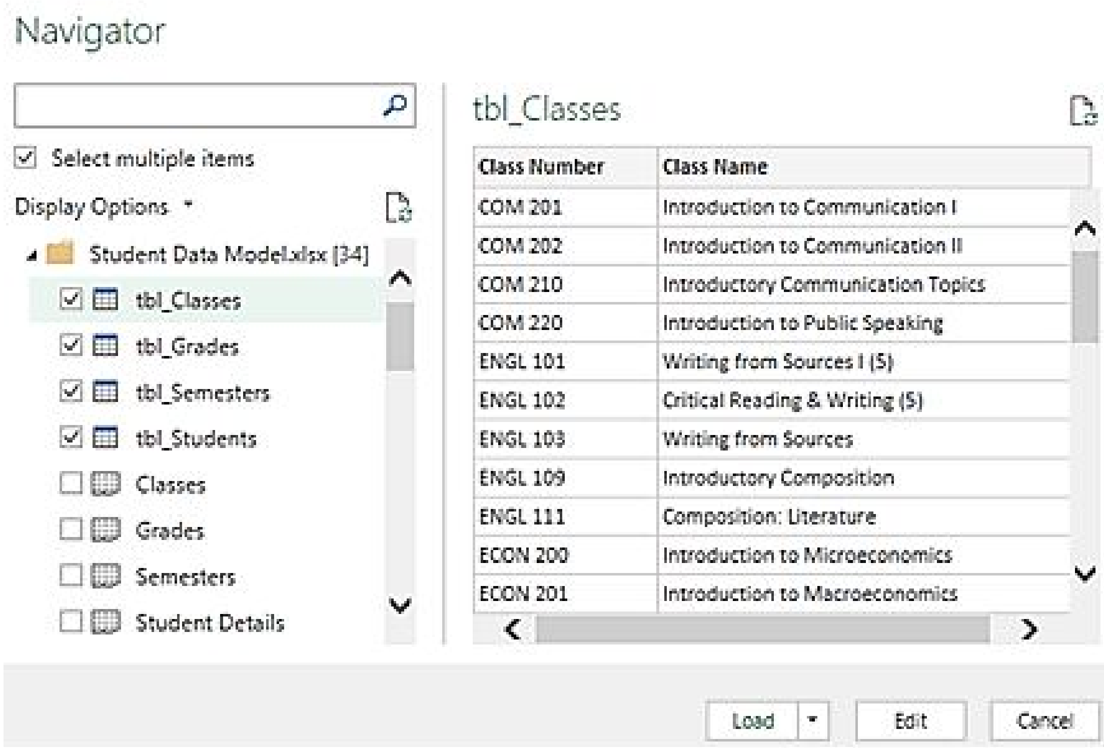
The Data Model is used to create a model in which data from multiple sources may be merged by establishing linkages between them. A Data Model joins the tables together, allowing for in-depth analytics utilizing PivotTables, Power Pivot, and Power View. By constructing connections based on a common column, it is possible to integrate data from various tables.

This data model enables data to be loaded into Excel's storage. It's preserved in memory, where we can't view it immediately. Then you may tell Excel to use a similar column to link the data together. Even though the information is spread across different tables, the Data Model can obtain it all. Excel does have the data in its cache once the Data Model is built. The data in its memory may be obtained in a variety of ways.

Whenever you load two or more tables from a database at the same time, a Data Model is built automatically. The Data Model in Excel is built using the existing database connections between those tables.

The first thing to do before building a table is creating to get some data. Simply click on Data. Pick Get and Transform Data. Then, pick Get Data. This is done so as to import data from any external sources.

When you have done this, a table will be presented before you. If you need multiple tables from one particular source, then you need to click on the box next to the Enable selection of multiple table option. A data model will be created for you by Excel whenever you choose more than a table.



So, choose one or more tables. Then, pick Load. You can edit the source data if you want to. Simply click the Edit option there. So, you have a data model with the tables you have loaded. They will be displayed in the Pivot Table Field List.

Note: Whenever you import two or more tables into Excel at the same time, models are built implicitly.

When you utilize the Power Pivot add-in to import data, models are generated directly. The model is displayed in the add-in in a tabbed form similar to Excel, with each tab containing tabular data.

A single table may be included in a model. Pick the table and hit Add to Data Model in Power Pivot to construct a model based on only that table. If you wish to leverage Power Pivot capabilities like filtered datasets, calculated columns, calculated fields, KPIs, and hierarchies, you may do this.

If you import linked tables with main and foreign key connections, table connections will be generated automatically. In most cases, Excel can utilize the imported connection data to create table connections in the Data Model.

Performing what-if analysis

What-If Analysis is the act of altering cell values to observe how such changes influence the results of formulae on the spreadsheet. Scenarios, Goal Seek, and Data Tables are three types of What-If Analysis tools included with Excel. Scenarios and data tables use a collection of inputs and predict what could happen.

A Data Table only has one or two variables, but those variables might have many distinct values. Although a Scenario may contain several variables, it can only have 32 values. In contrast to Scenarios and Data Tables, Goal Seek takes a result and finds potential input values that create that result.

When you have a data table in excel, it is easy for you to differentiate between one or two inputs and you will perform a What-if analysis. The two types of Data Types include; **One-variable Data Tables** and **Two-variable Data Tables**. When your analysis problem contains more than two variables, you will utilize the Scenario Manager Tool.

One-variable Data Tables

This type is utilized when you want to examine the difference between the values of a variable and another variable and how the formula affects the outcome of the calculations. You use this to see how altering one input affects another number of outputs.

We will work with the example below;

Example: John has a loan of 5,000,000 for a tenure of thirty years. Now, you would like to figure out the payments that are made monthly for different interest rates. You also want to know the interest amount and its principal that is being paid the second year.

So, to carry this out, you have to follow the three steps below;

1. Setting the background
2. Creating the Data Table
3. Performing the Analysis

First Step: Setting the Background

- Let’s assume that the interest rate is twelve percent.

- Then, put in all the values required
- Assign a name to the cells that consist of the values. This is done so that the formulas in the data will have names rather than having cell references.
- Put the calculations for EMI, Cumulative Interest, and Cumulative Principal with the functions in Excel (PMT, CUMIPMT, and CUMPRINC).

The image below is how your worksheet should be;

	A	B	C	D
1				
2		Rate per Annum	0.12	Interest_Rate
3		No. of Monthly Payments	360	NPER
4		Loan Amount	5000000	Loan_Amount
5		Type	0	Type
6		EMI	=PMT(Interest_Rate/12,NPER,Loan_Amount,0,Type)	EMI
7		Start Period	13	Start_Period
8		End Period	24	End_Period
9		Interest paid in the 2nd Year	=CUMIPMT(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Interest
10		Principal paid in the 2nd Year	=CUMPRINC(Interest_Rate/12,NPER,Loan_Amount,Start_Period,End_Period,Type)	Cum_Principal

Second Step: Creating the Data Table

Here, you will put in the list of values. There are the interest rates that you will like to replace in the input cell. In the image below, you will find out that there is a space in the first row of the Interest Rate values. This is because, on that row, is where you have to put in the formula which you want to use.

	E	F	G	H
1	Interest Rate	EMI	Cum Interest	Cum Principal
2				
3	12.0%			
4	12.2%			
5	12.4%			
6	12.6%			
7	12.8%			
8	13.0%			
9	13.2%			
10	13.4%			
11	13.6%			
12	13.8%			
13	14.0%			

Enter in the first function (PMT) in the cell one row above one cell to the right. Enter the other functions in the cells to the right of the first function.

	E	F	G	H
1	Interest Rate	EMI	Cum Interest	Cum Principal
2		=EMI	=Cum_Interest	=Cum_Principal

	E	F	G	H
1	Interest Rate	EMI	Cum Interest	Cum Principal
2		-51430.63	-596722.48	-20445.08
3	12.0%			
4	12.2%			
5	12.4%			
6	12.6%			
7	12.8%			
8	13.0%			
9	13.2%			
10	13.4%			
11	13.6%			
12	13.8%			
13	14.0%			

Third Step: Performing the Analysis

- First, choose the range of cells. The cells to be chosen should contain the formulas and the values which you wish to substitute.
- Select the Data Tab and pick What-If analysis.
- Pick Data Table. The dialog box will display.
- Choose the icon in the column input box.
- Select the Interest Rate cell. Click Ok.
- The calculated results will be displayed for you.

	A	B	C	D	E	F	G	H
1					Interest Rate	EMI	Cum Interest	Cum Principal
2		Rate per Annum	12%	Interest_Rate		-51430.63	-596722.48	-20445.08
3		No. of Monthly Payments	360	NPER	12.0%	-51430.63	-596722.48	-20445.08
4		Loan Amount	5000000	Loan_Amount	12.2%	-52201.67	-606808.26	-19611.75
5		Type	0	Type	12.4%	-52975.21	-616893.14	-18809.35
6		EMI	(51,430.63)	EMI	12.6%	-53751.16	-626977.01	-18036.93
7		Start Period	13	Start_Period	12.8%	-54529.45	-637059.83	-17293.52
8		End Period	24	End_Period	13.0%	-55309.98	-647141.50	-16578.21
9		Interest paid in the 2nd Year	-596722.48	Cum_Interest	13.2%	-56092.67	-657221.99	-15890.09
10		Principal paid in the 2nd Year	-20445.08	Cum_Principal	13.4%	-56877.46	-667301.22	-15228.27
11					13.6%	-57664.25	-677379.16	-14591.88
12					13.8%	-58452.99	-687455.77	-13980.09
13					14.0%	-59243.59	-697530.99	-13392.06

Two-Variable Data Table

This is used to examine how varying values of two variables that are in a formula affect the outcome of the formulas. you utilize it to see how two input affects a single output. Let's work with an example.

Example: JOHN has a loan of 50,000,000 and you would like to know the combinations made for the interest rates and loan tenures and the differences in them affects the payments made monthly. Just like the One-Variable Data Table, we will utilize the same steps.

1. Setting the background
2. Creating the Data Table
3. Performing the Analysis

First Step: Setting the background

- Let's assume that the interest rate is twelve percent.
- Then, put in all the values required
- Assign a name to the cells that consist of the values. This is done so that the formulas in the data will have names rather than having cell references.
- Put the calculations for EMI (PMT)

	A	B	C	D
1				
2		Rate per Annum	0.12	Interest_Rate
3		No. of Monthly Payments	360	NPER
4		Loan Amount	5000000	Loan_Amount
5		Type	0	Type
6		EMI	=PMT(Interest_Rate/12,NPER,Loan_Amount,0,Type)	EMI

Second Step: Creating the Data Table

Enter =EMI in cell F2

Put in the first list for the input values. Then, enter the second list for the input values.

E	F	G	H	I	J	K	L
	Interest Rate	Number of Payments					
EMI	-51430.63	240	264	288	312	336	360
Interest Rate	12.0%						
	12.2%						
	12.4%						
	12.6%						
	12.8%						
	13.0%						
	13.2%						
	13.4%						
	13.6%						
	13.8%						
	14.0%						

Third Step: Performing the analysis

- Pick the cell range that consists of the formula.
- On the Data tab, pick What-If analysis.
- Choose the Data Table. On the dialog box, select the icon in the Row input cell.
- Pick the NPER
- Click the Row icon again and select the icon in the Column input cell.
- Select the cell Interest Rate and click the Column icon again.

E	F	G	H	I	J	K	L
	Interest Rate	Number of Payments					
EMI	-51430.63	240	264	288	312	336	360
Interest Rate	12.0%	-55054.31	-53896.92	-53019.09	-52347.62	-51830.65	-51430.63
	12.2%	-55753.06	-54613.76	-53752.12	-53094.99	-52590.65	-52201.67
	12.4%	-56454.93	-55333.69	-54488.12	-53845.21	-53353.33	-52975.21
	12.6%	-57159.88	-56056.63	-55227.04	-54598.20	-54118.62	-53751.16
	12.8%	-57867.85	-56782.53	-55968.81	-55353.89	-54886.42	-54529.45
	13.0%	-58578.79	-57511.32	-56713.34	-56112.19	-55656.67	-55309.98
	13.2%	-59292.63	-58242.93	-57460.58	-56873.03	-56429.28	-56092.67
	13.4%	-60009.33	-58977.32	-58210.45	-57636.35	-57204.17	-56877.46
	13.6%	-60728.83	-59714.41	-58962.89	-58402.07	-57981.27	-57664.25
	13.8%	-61451.09	-60454.15	-59717.83	-59170.11	-58760.51	-58452.99

Analyzing Data with Conditional Formatting

In Excel, conditional formatting is used to emphasize data based on certain conditions. It would be tough to see different patterns merely by looking at your Excel worksheet. In Excel, conditional formatting allows you to visualize data and make spreadsheets more understandable. It enables you to add formatting to cell values such as colors, icons, and data bars based on the cell values. For data visualization, you may utilize Conditional Formatting. Processing for a cell range must be specified depending on the contents of the cell range. The cells that fulfill the provided criteria will be formatted according to your specifications.

It makes it simple to scan your data and check for vital signs graphically. With numerical data, conditional formatting works best. Simply choose a column of data and make sure you're on the Home tab of Excel's ribbon to get started. From the Conditional Formatting dropdown menu, you may choose from a variety of styles. Each of the formats your cells in a different way, but they all adjust to the cells you've highlighted.

Instance

You may emphasize those cells in a range holding the sales statistics for the previous quarter for a group of salespeople who have fulfilled the stated objective, such as $2500.

You may give a color code of green and a requirement of total sales of the individual >= $2500. Excel evaluates each cell in the range to see whether the criterion you set, i.e. the person's total sales >= $2500, is met.

Excel uses the format you specified, i.e. the green color, to highlight any cells that meet the requirement. The formatting of a cell stays unaltered if the content of the cell does not meet the requirement. The outcome is as predicted; only the salespeople that reached the goal have their cells highlighted in green, providing a simple visual representation of the analysis findings.

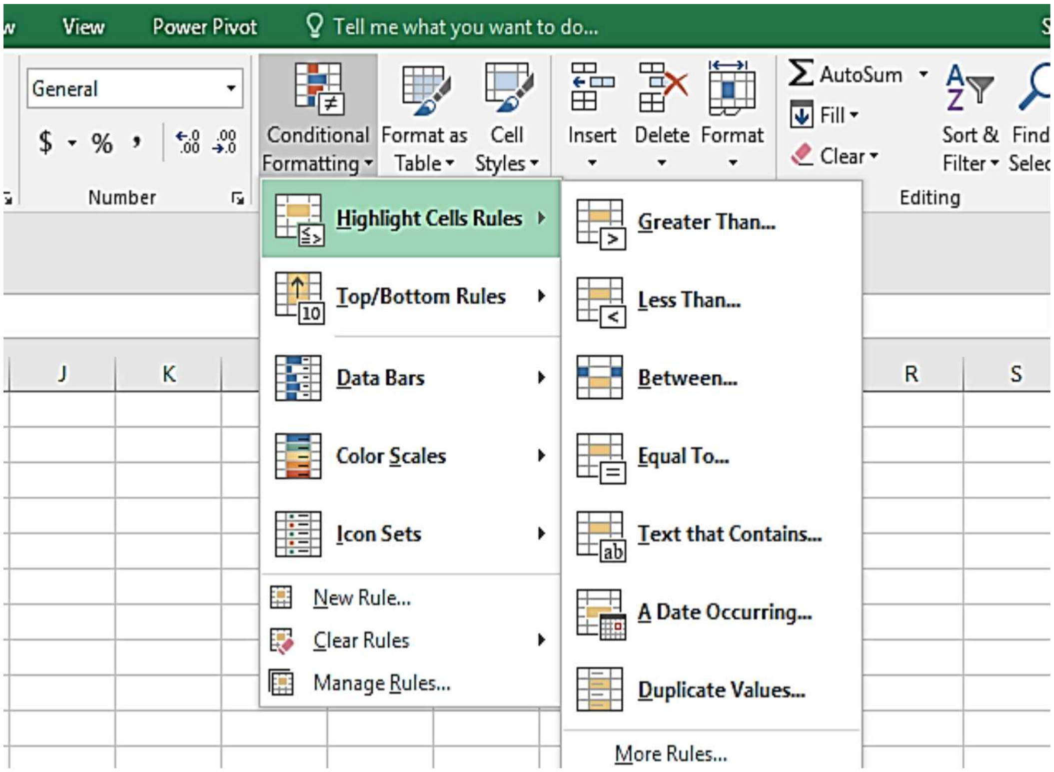
Highlighting cells that meet some criteria

You can utilize the highlight cell rules to give a format to the cells that the contents in it meet up the following criteria;

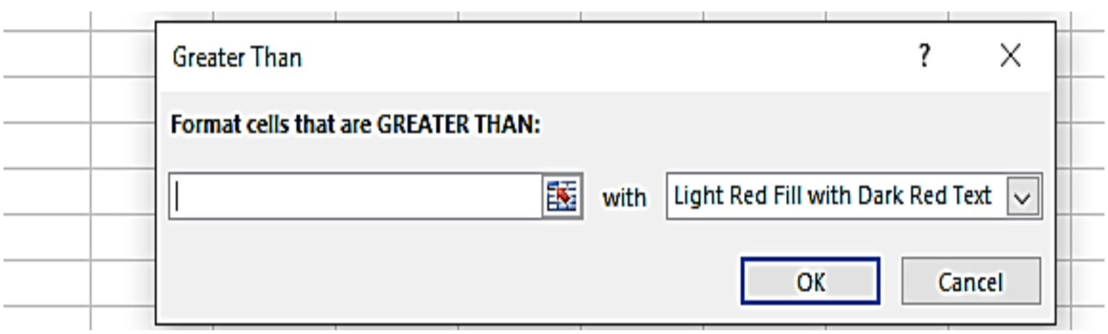
1. Numbers within a particular numerical range-
   - Equal To
   - Less Than
   - Between
   - Greater Than
2. Text that consists of particular text strings
3. Dates that occur within a particular date ranges
   - Yesterday
   - Today
   - Next Month
   - Tomorrow
   - This month
   - In the last seven days
   - Last month
   - Last week
   - Next week
   - This week
4. Values that are duplicate or unique

With the steps below, you can conditionally format cells.

- First, you pick the range that is to be conditionally formatted.
- Move to the style group on the home tab and pick Conditional Formatting.
- Select Highlight Cells Rules.



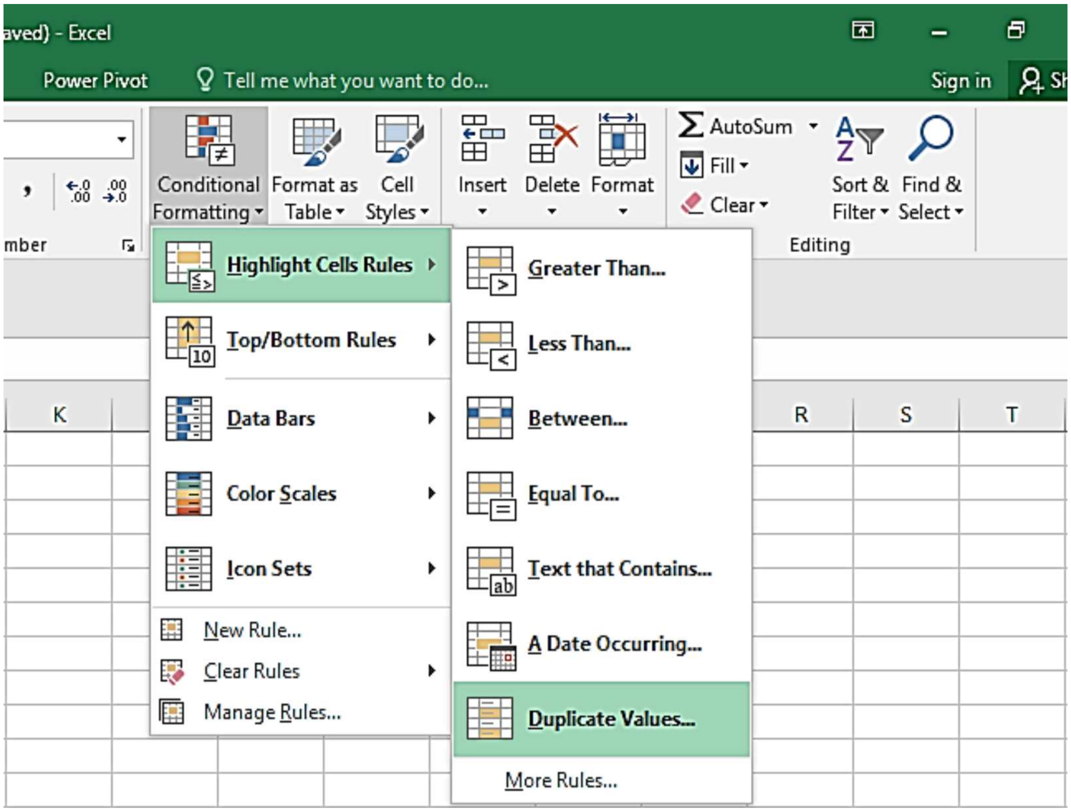
From the options listed for you, you can select the ones you want to highlight. When you click on any of the options, for instance, you select Greater Than, you will be directed to a menu where you will be asked to input the number which is to be greater than and the format to be used. Just as you can see in the image below.



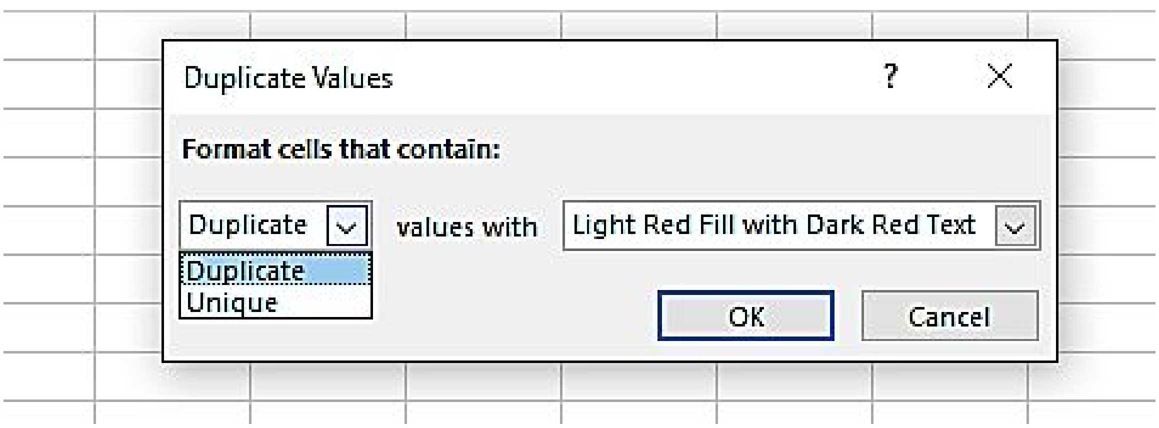
When you are done, click Ok. You will have the cells selected with the color you have picked out.

Showing pesky duplicate values

Simply follow the same steps above but now you will select Highlight cell rules and pick Duplicate Values.

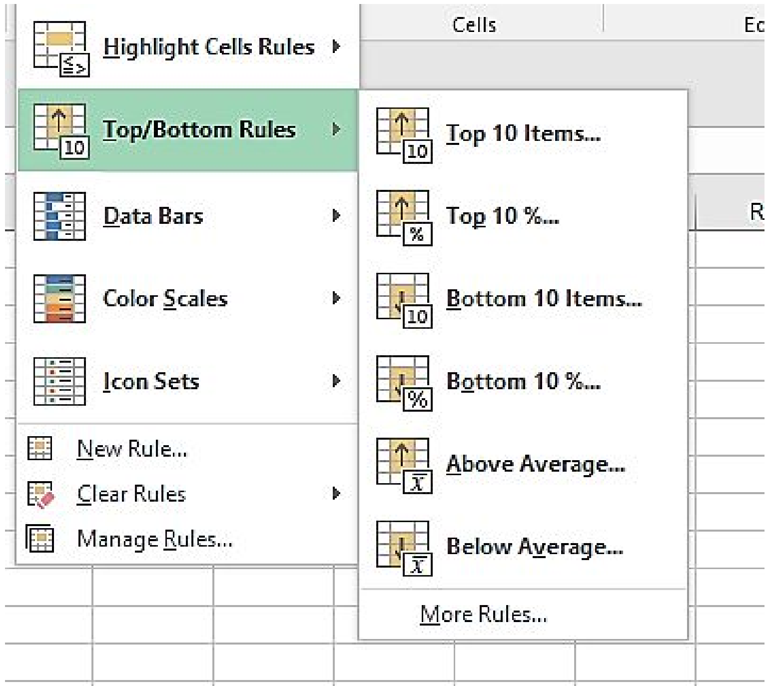


Then, you follow the on-screen instructions in the dialog box where you will put in the values and the format you want.

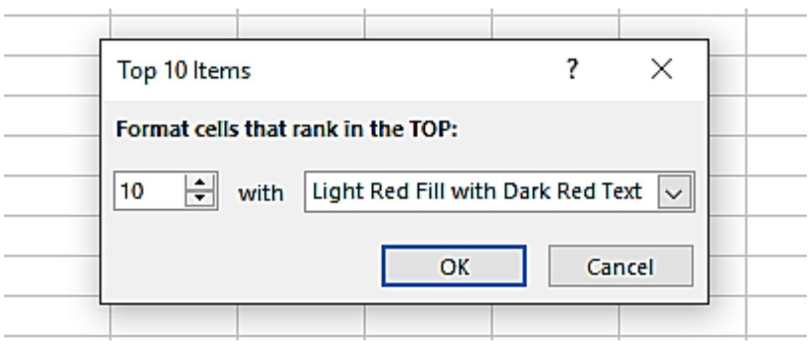


Highlighting the top or bottom values in a range

Simply follow the same steps above but now you will select the Top or Bottom rules.



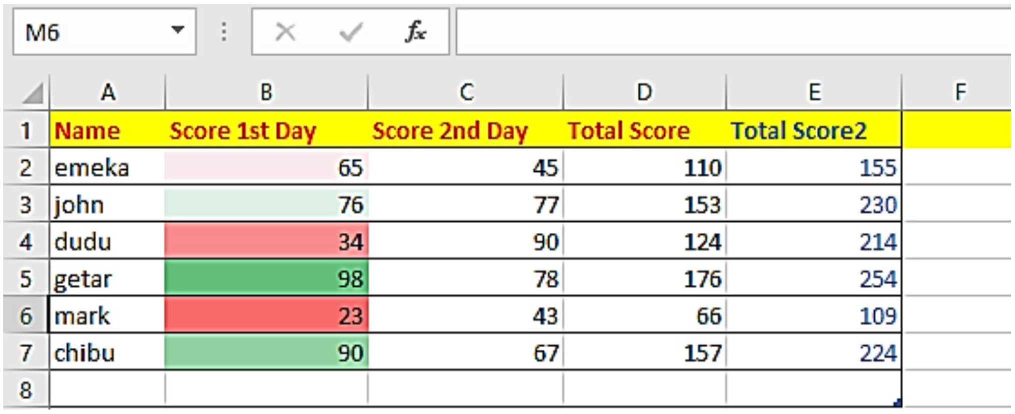
Then, put the values in the next dialog box and the format you want for it.



Analyzing cells values with color scales

Color Scales may be used to examine how a cell's value compares to the values in other cells in a range. Color Scales, like Highlight Cells Rules, employ cell shading to show the changes in cell values. To a set of cells, a color gradient will be applied. Each cell value's color shows where it falls within that range.

Select the column or row. Click on **Conditional formatting** and select Color Scales which will display a list of different color scales for you to select from. Select one and it will be applied to your worksheet.



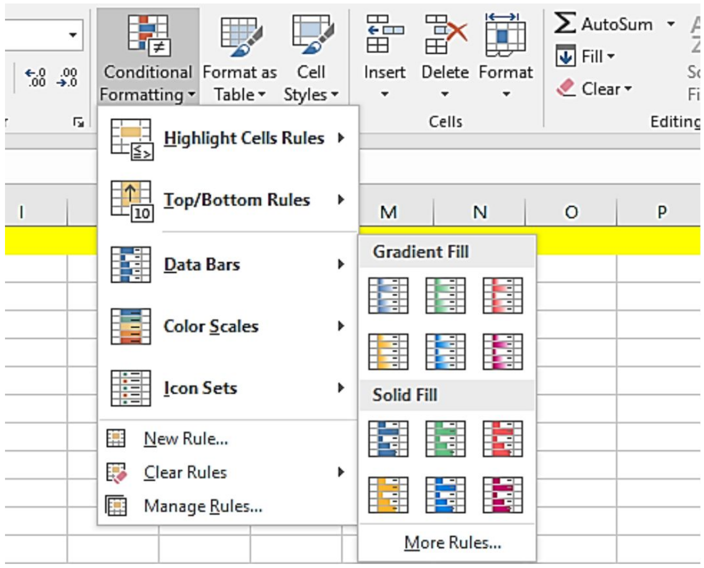
	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2	
2	emeka	65	45	110	155	
3	john	76	77	153	230	
4	dudu	34	90	124	214	
5	getar	98	78	176	254	
6	mark	23	43	66	109	
7	chibu	90	67	157	224	
8						

Analyzing cells values with data bars

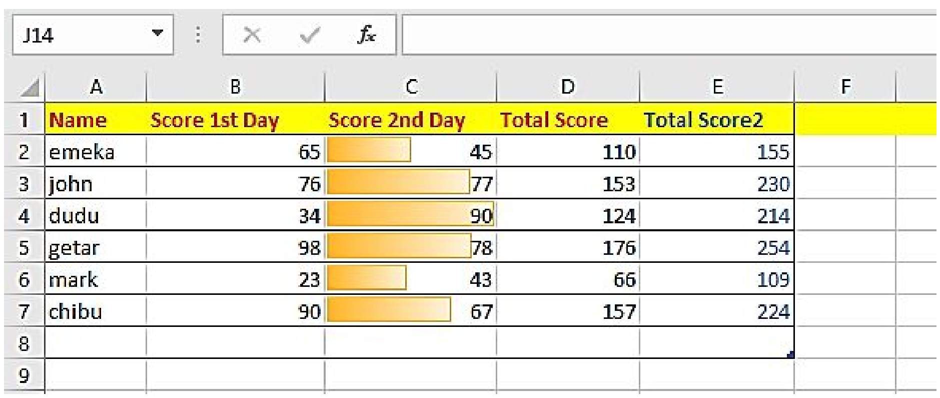
Colored Data Bars may help you see how a cell's value compares to the values in other cells. The value in the cell is represented by the length of the data bar. A greater value is represented by a longer bar, whereas a lesser value is represented by a smaller bar. Blue, green, red, yellow, light blue, and purple are the six solid colors available for the data bars.

Whenever you have a lot of data, data bars may assist you to see the higher, lower, and intermediate numbers. Daytime temps throughout areas in a given month, for instance. Gradient fill color bars may be used to illustrate a cell's value in relation to the values in other cells. Blue, Green, Red, Yellow, Light Blue, and Purple are the six Gradient Colors available for the Data Bars.

Horizontal bars are shown directly in the cell using the data bars conditional format. The length of the bar is determined by the cell's value in comparison to the other values in the range. To do this, simply select the column or row. Click on **Conditional formatting** and select Data bars which will display a list of different data bars for you to select from.



Pick one and the effect will be applied to your worksheet.



	A	B	C	D	E	F
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2	
2	emeka	65	45	110	155	
3	john	76	77	153	230	
4	dudu	34	90	124	214	
5	getar	98	78	176	254	
6	mark	23	43	66	109	
7	chibu	90	67	157	224	
8						
9						

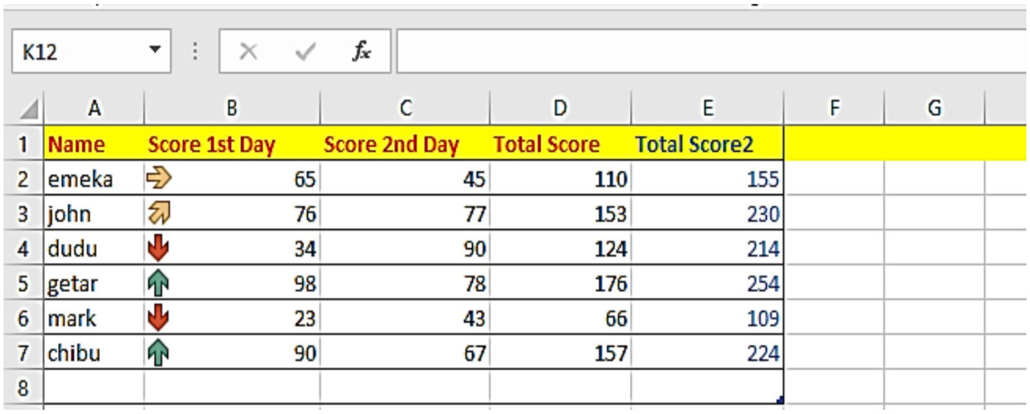
Surprisingly, the colors used for data bars are not theme colors if you pick one of the 12 data bar types. The data bar colors do not change when you alter the document theme. However, if you use the New Formatting Rule dialog box to add the data bars, the colors you pick are theme colors.

Analyzing cells values with icon sets

An icon set comprises three to five symbols, as you can see. To connect an icon with each value in a cell range, you may create criteria. Small numbers are represented by a red down arrow, high numbers by a green up arrow, and intermediate values by a yellow horizontal arrow.

Select the column or row. Click on **Conditional formatting** and select **Icon Sets** which will display a list of different icon sets for you to select from.

Select one and it will be applied to your worksheet.

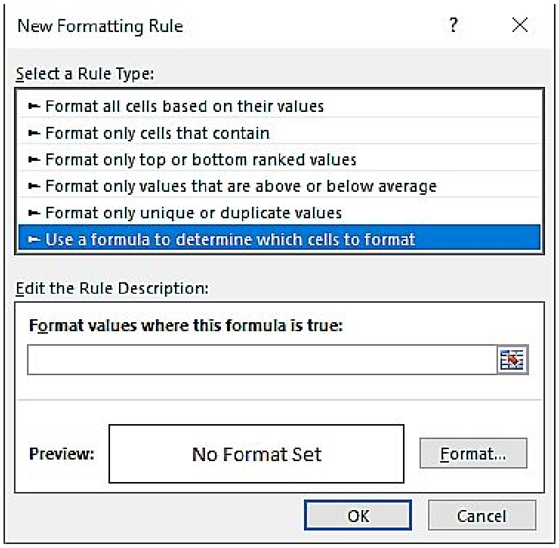


	A	B		C	D	E	F	G
1	Name	Score 1st Day		Score 2nd Day	Total Score	Total Score2		
2	emeka		65	45	110	155		
3	john		76	77	153	230		
4	dudu		34	90	124	214		
5	getar		98	78	176	254		
6	mark		23	43	66	109		
7	chibu		90	67	157	224		
8								

Creating a custom conditional-formatting rule

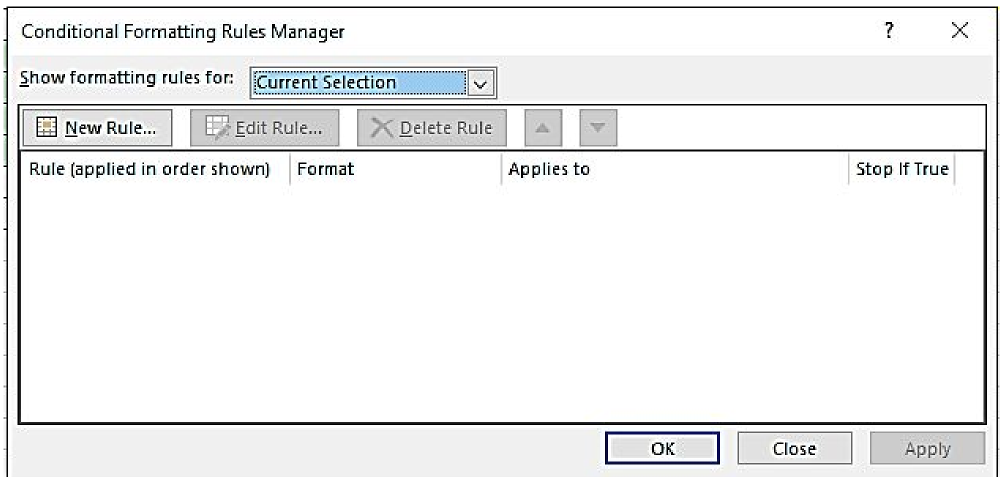
Although Excel comes with several "presets" for conditional formatting, they are restricted. You may, however, construct rules using your unique formulae. You may take over the situation that activates a rule and apply precisely the reasoning you need by creating your formula. Formulas provide you with the greatest amount of power and versatility.

To new rules, simply choose the cells. Then, on the Home tab, click on Styles > Conditional Formatting > New Rule. This will open up the new formatting rule dialog box. Click on the **Use a formula to determine which cells to format** option, and then type in the formula.

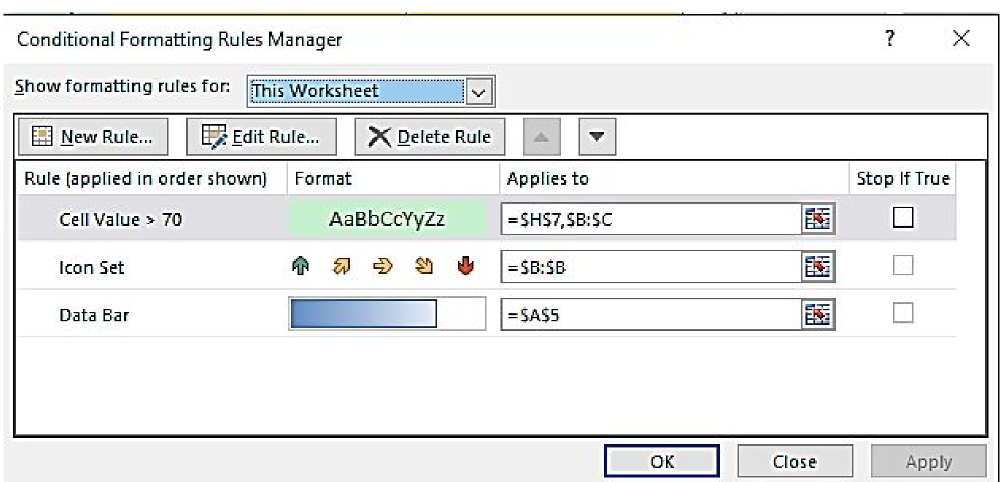


The formula has to be logical. It must return either TRUR or FALSE. When it is true, the conditional formatting will apply but when it is false, it will not apply. Note that the formula must start with an **equal to (=)** sign. Click Ok.

To access the conditional formatting rule, which you have created, click on **Manage Rules** on the conditional formatting menu. if the selection has cells that have conditional formatting applied to it, the rule will display in the Rules Manager window.



But if the current selection has no cells which have conditional formatting applied to it, then, the rules will not display. So, to make it display, click on the drop-down arrow on the "**Show formatting rules for"** option and select "**This Worksheet**". It will display all the rules and conditional formatting you have applied to that worksheet.

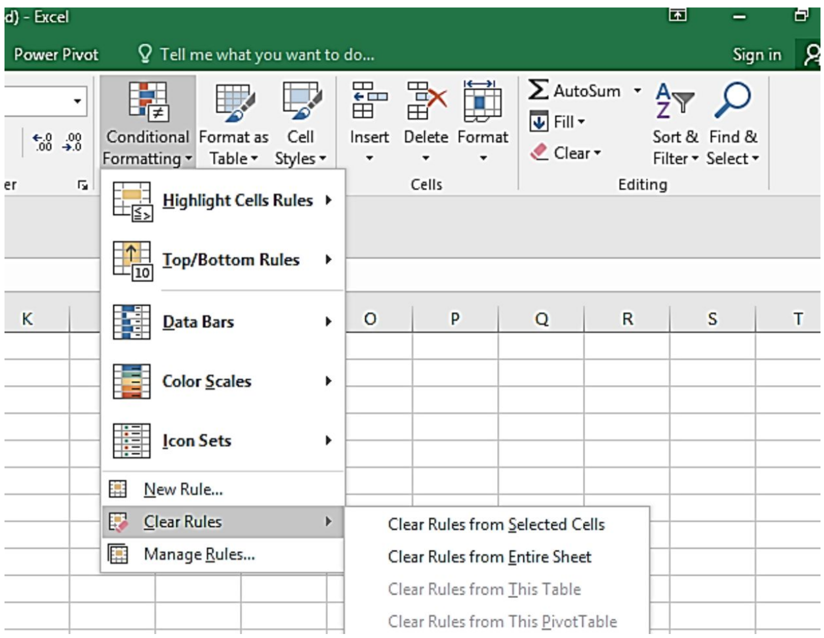


Editing a conditional-formatting rule

Simply choose the rule and pick the Edit rule. The Edit Formatting Rule box will display. On it, you can change the Rule Type, the Rule Description, and the Formatting. After that, click Ok.

Removing conditional-formatting rules

Use the Clear Rules option to delete all the formats you have created. You can do so on the selected cells, the current worksheets, the selected table, and the selected PivotTable.



Summarizing Data with Subtotals

In a list, Microsoft Excel can generate subtotal and grand total numbers instantly. Excel highlights the list whenever you add automated subtotals so you may show and conceal the detailed rows for every subtotal.

To add subtotals, organize your list so that the rows you wish to subtotal are together. Subtotals may then be calculated for any column with numbers. You may use AutoSum instead of automated subtotals if your data isn't arranged as a list or if you simply require a single total.

How are subtotals calculated?

Subtotals: A summary function in Excel, such as Sum or Average, is used to compute subtotal numbers. Subtotals may be shown in a list with many types of calculations at the same time.

Grand Totals: The numbers in the subtotal rows are not used to calculate grand totals; instead, they are obtained from detailed data. When you use the Average sum method, for instance, the grand total row shows the average of all detail rows in the list, not the values in the subtotal rows.

Automatic Recalculation: As you modify the detail data, Excel immediately dynamically adjusts the subtotal and grand total figures.

You may use Excel Subtotal and Outline to show overview rows or columns if you have a set of data that you wish to organize and summarize. You may also use PivotTable for this, but the fastest approach to study a range of data is to utilize Subtotal and Outline. It's worth noting that Subtotal and Outline may only be used on a range, not a table.

You may have up to eight layers in your outline, one for each group. Lower numbers signify outside levels, whereas higher numbers reflect inner levels. Each inner level offers extensive information about the outer level before it.

Grouping related data

- Simply select the rows or the column for the grouping. Then, click on the Data Tab and select Group from the Outline Section.
- This will show the Group dialog box. On it, you are to choose the rows or columns. Then, click Ok when you are done.

Consolidating Data from Multiple Worksheets

You may combine data from individual worksheets into the main spreadsheet to summarize and present findings from many spreadsheets. The worksheets may be in the same or other workbooks as the main spreadsheet. Whenever you consolidate data, you combine it so that you can modify and combine it more readily as needed.

For instance, if every one of your branch headquarters has its own expenditure spreadsheet, you may utilize consolidation to combine these statistics into a specific enterprise expenditure spreadsheet. This main spreadsheet might include revenues totals and averages, current inventory levels, and the company's best-selling goods.

There are two ways you can consolidate data which are Consolidating by position and Consolidating by category

Consolidating by position

The data inside the original area will be in the same sequence as the data in the destination areas, and the labels are the same. This approach may be used to combine data from a number of spreadsheets, such as a cost estimates spreadsheet built out of the same templates.

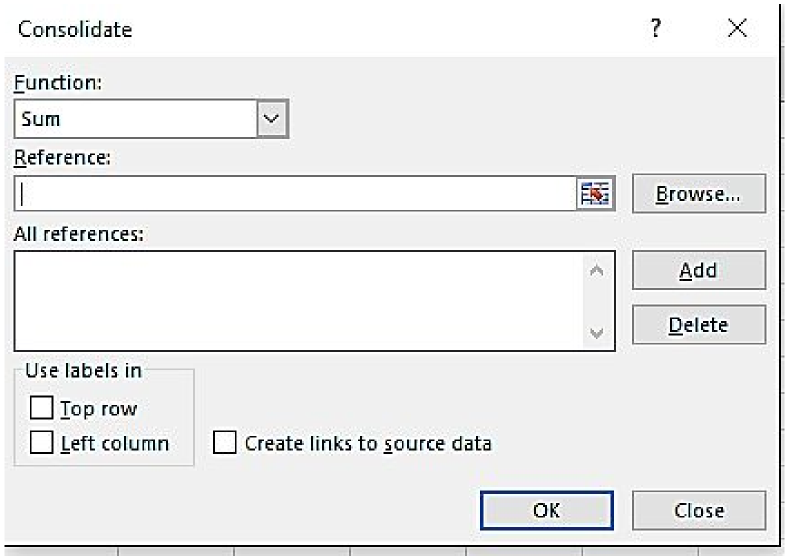
Consolidating by category.

Whenever the data in the original area is not in the same order as the data in the destination areas, the labels are the same. To integrate data from a succession of spreadsheets with varied layouts but the same data labels, use this procedure.

To combine many spreadsheets into the main spreadsheet, follow these instructions:

1. Build up the data in each component sheet as follows if you've not:
    - Ascertain that each data range is in list format. In the first row, every column should have a description (header) and comprises comparable data. In the whole list, there should be no empty rows or columns.
    - Set each range on its own spreadsheet, but leave the main spreadsheet blank until you're ready to integrate the data. This is something Excel will take care of for you.
    - Ascertain that every range has the same design.
2. In the main worksheet, pick the upper-left cell of the area i.e. the place you want the consolidated data to display.
3. Select the Data Tab and choose to Consolidate.
4. Now, the Function box will show. Pick the summary function which you want Excel to utilize when consolidating the data. SUM is the

default function.



5. Pick your data. In the box on the reference option, click the Collapse button. This is to shrink the panel so that you can select the data. Choose the worksheet that has the data. Choose the data and select the Expand Dialog button.

In a situation whereby the worksheet that has the data you want to consolidate is in another workbook, you have to select the Browse option. Search for the workbook and find the file.

6. Click Add. Then, repeat the steps so that you can add the ranges for the consolidation.
7. You can choose between automatic updates and Manual updates. If you want it automatically, then click the box next to the Create links to source data option. When the box is not clicked, it will update manually.
8. Select Ok.

Conclusion

Data analysis is a key aspect of every organization, and understanding how to utilize it flexibly when the situation calls for it is crucial. Excel and data analysis might be a great mix for this. Understanding your way around Excel and being comfortable doing data analysis with it can assist your business and profession. Whilst also starting up with Excel is simple, understanding it for data analysis will take some effort. It may, however, open doors for you at any age or level of your work. It is not too late to acquire or update your Excel abilities, particularly for data analysis, whether you're just commencing out or have been in a certain sector of work for so long.

CHAPTER TWO

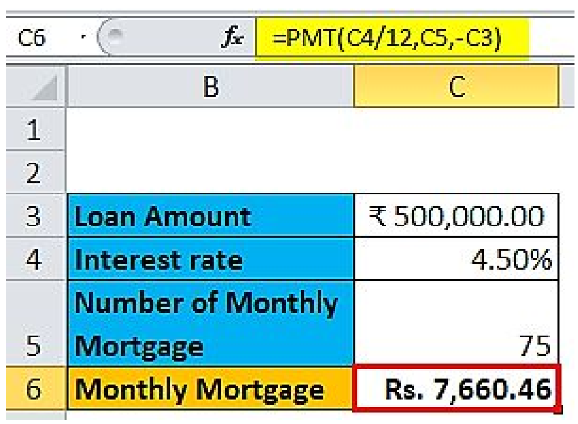
WORKING WITH DATA-ANALYSIS TOOLS

Working with data tables

Data tables are utilized to check the comparison between variables and how they affect the data and its outcome. It is a kind of What-If analysis tool that is found in the data tab in the What-If analysis section. This data table is of two types and is One Variable and Two-Variable.

Creating a basic data table

We will be working with the one variable here. The one-variable data table is helpful in instances when an individual wishes to see how changing interest rates affect the amount of money they have to pay on their mortgage. Examine the graph beneath, which illustrates the mortgage amount estimated utilizing the PMT function dependent on the interest rate.



C6 =PMT(C4/12,C5,-C3)

	B	C
1		
2		
3	Loan Amount	₹ 500,000.00
4	Interest rate	4.50%
5	Number of Monthly Mortgage	75
6	Monthly Mortgage	Rs. 7,660.46

The mortgage amount is determined depending on the interest rate, mortgage duration, and term loan in the table provided. The monthly mortgage payment is calculated using the PMT formula, which is represented as =PMT (C4/12, C5,-C3).

When calculating the monthly mortgage payment for various interest rates, the interest rate is treated as a variable. To do so, you'll need to create a data table with just one variable.

The following are the procedures to make a one-variable data table:

1. Make a column that will contain the values of the interest values.
2. Choose an empty cell and type in the formula. Use the column for the Monthly Mortgage as the cell reference.
3. Highlight the whole column for the different values. Also, highlight the cell where you have inserted the formula.
4. Select the Data Tab and choose What-If analysis. Then, pick Data Table
5. The dialog box will open. Enter the Row input cell and the Column input cell. You can do so by clicking on the cells in your worksheet.
6. Click Ok.

Another Example using the Two-Variable data table.

Two-variable data tables are helpful in situations whenever a user wants to see how their formula's outcome differs when two input variables are changed at the same time. The two-variable data table is helpful in situations when a person wants to see how varying interest rates and loan amounts affect the amount of money needed to pay off a mortgage. We may see them with immediate outcomes rather than calculating for different variables individually. Examine the graph below, that illustrates the mortgage amount estimated using the PMT function dependent on the interest rate.

C6 fx =PMT(C4/12,C5,-C3)

	B	C
1		
2		
3	Loan Amount	₹ 500,000.00
4	Interest rate	4.50%
5	Number of Monthly Mortgage	75
6	Monthly Mortgage	Rs. 7,660.46

The preceding sample is identical to our earlier sample for a one-variable data table. Cell C6 calculates the mortgage amount depending on the interest rate, mortgage duration, and loan amount. The monthly mortgage payment is calculated using the PMT formula, which is represented as =PMT (C4/12, C5, -C3).

To illustrate the two-variable data table with relation to the preceding sample, we will present the various mortgage amounts and let you select the best one for you by looking at the various interest rates and loan amounts. It is necessary to create a two-variable data table in order to accomplish this.

Creating a two-input data table

- On a worksheet, type in your values in a range of cells. For instance, cell B15 to B19.
- In another cell range, type in another value. For instance, cells C14 to G14
- In cell B14, enter in the following formula; **=A14*2+A15**
- Choose cell B14 to G19
- Click Table in the Data Tab. Enter in A15 in the row input and enter A14 in the column input.
- Click Ok.

Analyzing data with Goal Seek

Goal Seek is a What-If Analysis tool integrated into Excel that demonstrates how one variable in a calculation affects another. It decides whatever value to input in an input cell in order to receive the expected results in a formula cell.

The nicest part of Excel Goal Seek is that it does all of the work for you, and all you have to do is provide these three parameters:

- Target/desired value in a formula cell
- The cell that must be changed in order to meet the goal

The Goal Seek tool is particularly effective for parameter estimation in corporate finance, and it is commonly used by management students and company owners. However, there are numerous additional applications that may be beneficial to you.

Goal Seek, for instance, may inform you how many sales you need to accomplish in a certain time to achieve a $100,000 yearly net profit (example 1). Or, what grade do you need to get on your final test to get a 70 percent total passing grade (example 2)? Alternatively, how many votes do you need to win the election? (example 3).

Stop making assumptions and utilize the Excel Goal Seek function if you want a formula to deliver a certain result but aren't sure what input value inside the calculation to alter to obtain that result.

At any one moment, Goal Seek can only process one input value. If you're working on a complex marketing strategy with several real numbers, the Solver add-in may help you identify the best answer. So, let’s look at how to use this tool.

	A	B	C
1		Goal Seek	
2	Item price	$5	
3	Qty.	100	Variable
4	Commission	10%	
5	Revenue	$450	=B2*B3*(1-B4)

The table you are seeing above shows that when you sell 100 items at 5 dollars per item, you will get $450, with the 10% commission not included.

Below is how you analyze your data with this tool:

- Set your data. It should have a formula cell as well as a changing cell which will be dependent on the formula cell.
- On the Data tab, select the Forecast Group. Choose the What-If analysis icon and pick Goal Seek.
- In the dialog box, choose the cell or values. You will find the following in the box;
    - **By changing cell**: This is the input reference for which you will adjust
    - **Set cell**: This is the cell reference that consists of the formula
    - **To value**: This is the result of the formula that you are trying to get.
- Click **Ok**.
- The Goal Seek Dialog box will show. It will inform you whether there has been a solution or not. When there is a solution, the changing cell value will be substituted with another value.
- Select Ok.

Analyzing Data with Scenarios

As a company owner, you devote much time weighing the pros and cons of various business conditions. It could be the pricing of a particular model, adjusting budget estimates, or evaluating alternative leases or items you're thinking about buying.

Whatever you're computing, you'll want to evaluate various options to see which one is perfect for you. Excel is a useful tool for examining various situations, and its Scenario manager feature makes comparing choices side by side a breeze.

To utilize the Scenario tool, you must first construct a spreadsheet containing mathematical formulae that will serve as the foundation for your study. This form of a worksheet is known as a model, and it's where you'll put the data for each of the objects you're analyzing.

Create a Scenario

- First, you have to set up your worksheet. So, on a new worksheet, give sheet one a name. Name it Budget.
- On that sheet, put in the marketing budget.
- Name the following cells
    - B1: Dept
    - B3: Sales
    - B4: Expenses
    - B6: Profit
- Type in the formula in cell B6: =Sales – Expenses

Below are the steps to create the scenario

- Move to the Data Tab and choose What-If Analysis
- Select Scenario Manager. Click the Add icon.
- Enter the name for the scenario that you want to create. Here, use Marketing.

- Navigate to the Changing cells box. Choose cell B1.
- Press the control key and choose cells B3 and B4. You have a limit of 32 changing cells
- Navigate to the Comment box. Enter the comment which will explain the scenario. This is optional
- Select Ok.
- On the Scenario Dialog box, you can adjust the values in it.
- Click Ok.
- Select Close.

Edit a Scenario

- Move to the Data Tab and choose What-If Analysis
- Select Scenario Manager. Select the scenario you want to edit by highlighting its name.
- Select the Edit button. Then, make your modifications
- Select Ok.

Delete a Scenario

- Move to the Data Tab and choose What-If Analysis
- Select Scenario Manager.
- Choose the scenario name that you want to delete and press Delete.

Optimizing Data with solver

Understanding solver

Solver is a Microsoft Excel add-in tool that may be used for what-if analysis optimizations. Optimization analysis, according to O'Brien and Marakas, is a more advanced expansion of goal-seeking analysis. Rather than specifying a precisely targeted value for a parameter, the purpose is to determine the best value for one or more target variables while keeping certain limitations in mind. Then, according to the established limitations, one or more additional variables are adjusted frequently until the optimal values for the target variables are discovered.

Solver is a feature in Excel that allows you to determine an ideal value (maximum or minimum, or a specific value) for one formula in one cell called the objective cell, subject to particular restrictions or limitations on the values of other formula cells on the spreadsheet. This implies that the Solver uses a set of cells known as choice variables to compute the formulae in the goal and limitation cells. The variables in the choice variable cells are adjusted by Solver to fulfill the constraints on constraint cells and generate the desired outcome for the goal cell.

The advantages of solver

Linear Algebra

Balancing equations using a single unknown parameter is a comparatively simple operation. When there are numerous unknowns in a large number of input equations, nevertheless, the method becomes considerably more time demanding and difficult. Solver's capacity to analyze cases with several unknown variables fast is an important feature. This is commonly known as "linear algebra." While traditional Excel formulae do simple calculations, Solver goes a step further by using Excel's math processor to conduct complex problem-solving algorithms to get outcomes for numerous variables at the same time. This is especially beneficial when there are a lot of unknowns or when there are many separate sets of equations.

Optimization

Solver's main aim in the business sector is optimization. Many product development cycles, like linear algebra, are impacted by several variables, each of which may have a major operating margin or quality control. The solver can swiftly discover the importance of these aspects in meeting a company's intended objectives if the link between these factors and those goals can be represented quantitatively. For example, if you want to start a new vehicle service business and have half a million dollars, you may want to figure out how many cars you can acquire as a fleet. This is your objective, however, there are certain limitations. The amount of money you have is obviously a constraint, but you may also need specific minimum automobile sizes. The solver can show you how to fulfill all limitations while still getting the most fleet for your money if you can articulate them as mathematical assertions. Solver has streamlined your business strategy in this manner.

Education

While Excel's solver is a wonderful foundation for the potential of "what if" analysis, it is also a restricted product for tasks that are extremely vast. Many businesses have their own specialized software that functions in a similar way as Solver but can handle far bigger data sets and many variables at the same time. These techniques, on the other hand, are out of reach for students who need to grasp the principles of optimization and linear programming, a related mathematical discipline. Excel's widespread use has led to certain educational institutions including Excel Solver in their curricula. This application is a huge help for educational institutions that need to explain these ideas without investing in more complex tools.

Loading the Solver add-in

- On the workbook, click on the File Tab and choose Options.
- Click on Add-Ins and choose Manage Excel Add-ins.
- On the dialog box, tick the box on the Solver Add-In option.
- Click OK.

Adding constraints to Solver

- Select Add on the Subject to Constraints which you will see below the Solver Parameters Box.
- Put in the cell reference for the constrain. You will use a single cell or a range of cells. You cannot use multiple cells.
- Select the relationship that you want. the relationship is what you want to be in the middle of the constraints and the cell reference.

- Enter a number in the Constraint box. It can be a formula, cell reference, or name.
- Select Add if you want to accept the constraints and put another one. Click Ok to just close the box.

Conclusion

There are different data analysis tools that you can work with in Excel. Some of them have been listed out here. Utilize the examples listed in this chapter to help you know how to use them.

CHAPTER THREE

INTRODUCING EXCEL TABLES

Being systematic is one of the keys to successful data analysis. I'm not referring to your desk or workplace, but rather your data. Data processing from a spreadsheet with hastily put numbers and text will be almost difficult. Why? Because Excel is the software world's tidy freak. Excel serves up its hands and cries, "I can't operate under these circumstances!" if data is scattered around the page in any manner.

However, Excel recognizes that the rest of us aren't that organized, so it provides the table — a powerful tool that can help you not just line up your data like soldiers on parade, but also analyze it and extract relevant information. In this chapter, you'll learn what tables are and why they're so important in data analysis. You'll also learn how to create, analyze, sort, and filter a table.

What are a Table and its importance?

Tables are utilized to arrange data that would be too extensive or complex to be fully presented in a paragraph, enabling the viewer to see the findings swiftly. They may be utilized to emphasize data patterns and themes, as well as to remove numeric data from a document to make it more legible.

Tables make provision for quick and easy reading of problems shown in rows and columns. Due to their basic form, versatility, and simplicity of adaptation, they may be used as a standard method for advantage dialogue.

Microsoft Excel makes it simple to create tables and do computations. Its working area consists of a series of cells that must be filled with information. As a result, the information may be structured and utilized to create graphs, charts, and summary reports. Working with tables in Excel may seem hard at first look to a novice. It varies significantly from Word's table creation concepts.

Understanding a table’s structure

A table in excel consists of many elements which are explained below;

The header row

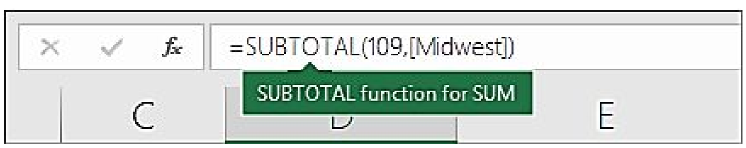
Every table in Excel consists of a header row. The columns in a table have filtering enabled in the header row. This is to enable you to filter your table as well as sort it easily.

Calculated columns

You may build a calculated column by inserting a formula in one cell in a table column and having that formula automatically applied to all other cells in that table column.

The total row

When you add a total row to a table, Excel provides an AutoSum drop-down list from which you may choose among functions like SUM, AVERAGE, and others. When you choose one of these choices, the table will convert it to a **SUBTOTAL** function, which by default ignores rows that have been concealed by a filter. You may adjust the SUBTOTAL function parameters to include hidden rows in your computations.



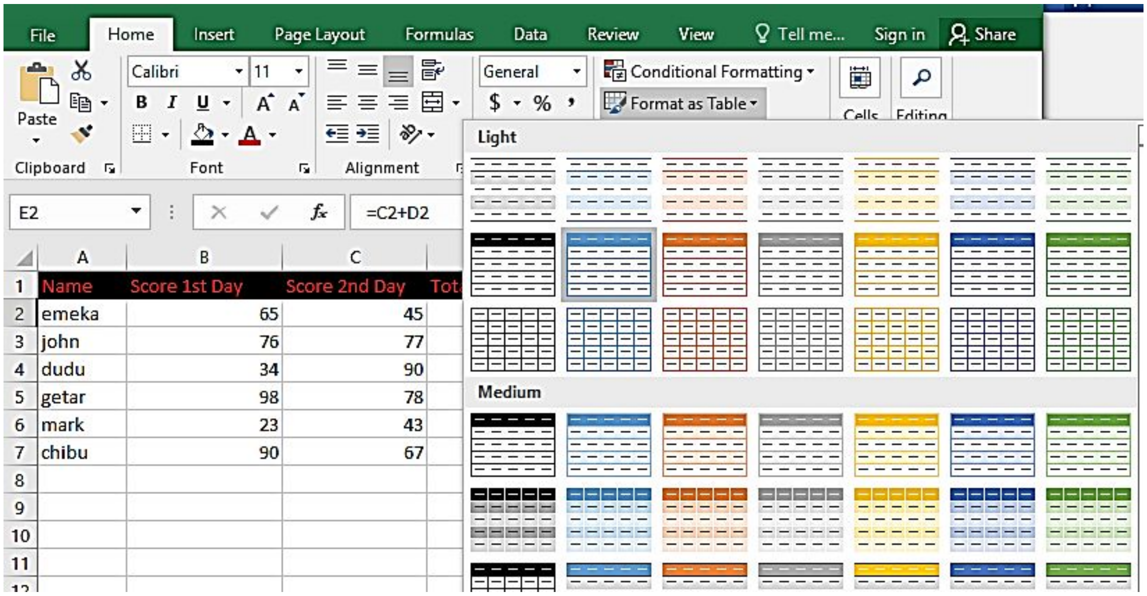
Building a Table

Tables in Excel are useful for providing data collections structure. It contains several useful features, such as data organization, headers, and applied filters. Tables may be accessed via the Insert menu tab or the shortcut key **Control key + T**. All we have to do now is choose the range of cells we want to include in the table. The Design tab, which appears when we pick the table, allows us to adjust table styles.

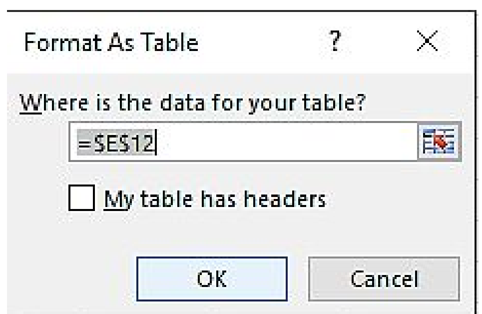
Follow the steps below to create a table.

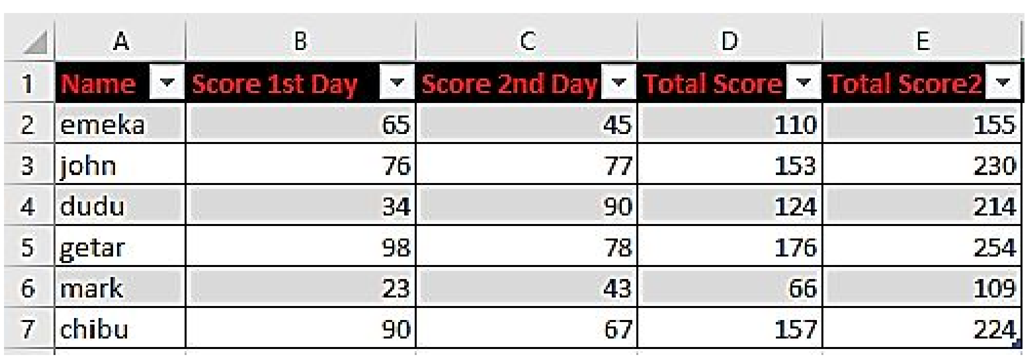
Choose the cell or range you want to create the table on.

Click on the Home tab, then click on **Format as Table**. This will display a menu that consists of some table styles. Choose any style you want.



When you click on the style you want, a dialog box will open. Check the box on the My table as header (Checking this box makes the first row of the range the header row) and click Ok.





	A	B	C	D	E
1	Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2
2	emeka	65	45	110	155
3	john	76	77	153	230
4	dudu	34	90	124	214
5	getar	98	78	176	254
6	mark	23	43	66	109
7	chibu	90	67	157	224

Converting a range to a table

- First, select the range that you want to convert. Click on the Insert Tab and choose Table.

- The dialog box for table creation will display. Click on the box next to the My table that has headers i.e. if it has headers. Click Ok.

You can also format it as a table if you want to. Simply choose the range, then on the home tab, choose Format as Table. Then, pick the table style you want. **Follow the on-screen instructions.**

Analyzing Table Information

- Choose the cell that you want to analyze. Select the Quick Analysis button that shows at the bottom right of the data you have selected. You can also do this by pressing the Control key + Q.
- Choose the tab that you want. Select an option.

We can use a pivot tool to summarize large volumes of data. It is mostly used to comprehend and detect patterns in the data set and is one of the finest methods to analyze data in Excel.

Pattern recognition in a tiny dataset is straightforward. However, because of the size of the datasets, finding patterns typically requires extra research. A pivot table may be a tremendous help in these situations since it simply takes a few minutes to summarize groupings of data using one.

Consider the following scenario: you have a dataset with regions and sales numbers. You may be interested in knowing the number of sales by region, which may be utilized to discover why a region is underperforming and how to improve in that area. You may quickly produce a report in Excel using a pivot table and store it for further examination.

In Excel, a Pivot Table enables you to summarize data as averages, sums, or counts from data in another Spreadsheet or table. Because you can organize and view data rapidly, it's ideal for swiftly creating reports.

For instance, if you're doing data analysis, you could have created a spreadsheet that you can copy and paste into Excel, or use in Google Docs if you prefer (simply go to File > Make a Copy).

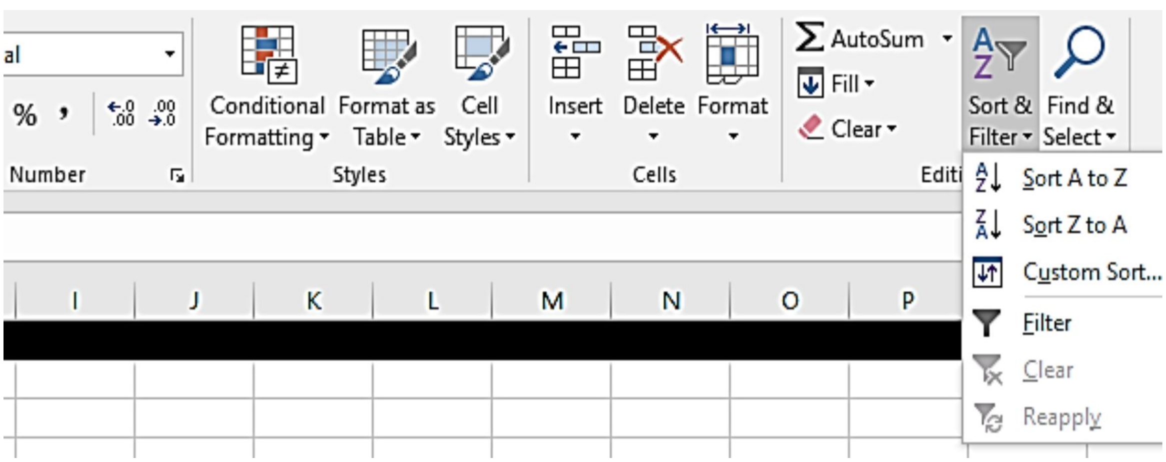
The spreadsheet includes data from a fictitious company's client purchases. Because firms buy at various times, we'll use a pivot table to aggregate this data so we can view total purchases per company and compare transactions across companies for easy analysis.

Adding a column subtotal

- First, you have to choose the data range. Then, choose Data and choose Subtotal.
- A dialog box will display and that is the Subtotal dialog box. Select the options you want from the list of options given to you.
- After that, select Ok.

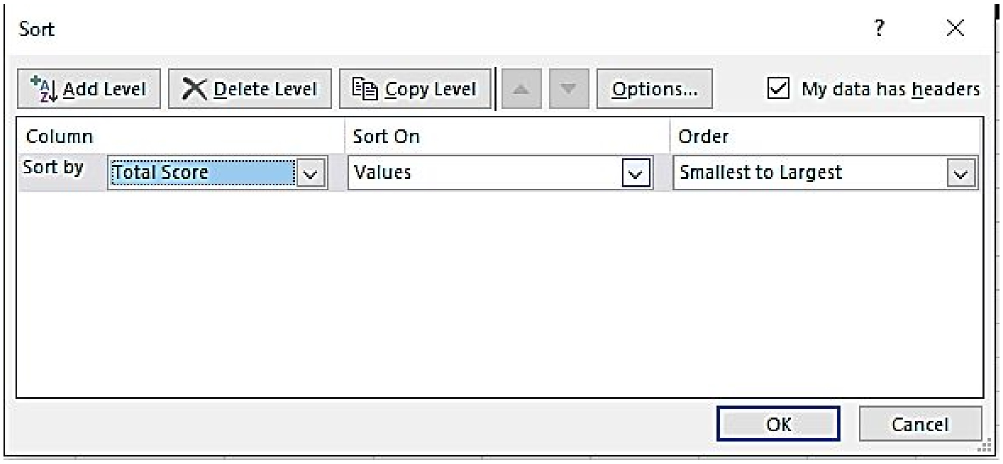
Sorting table records

One of the most frequent data management tools is sorting. You may sort your table in Excel by one or more columns, ascending or descending order, or by performing a custom sort. First, click on the cell. Then, click on Sort & Filter.



You will have different sorting options.

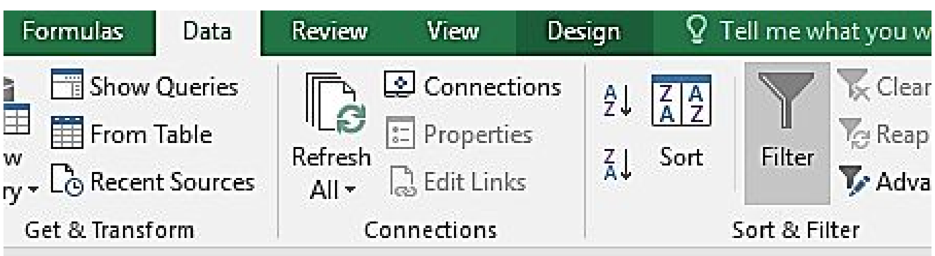
- **Sort A to Z:** This is to sort in ascending order
- **Sort Z to A:** This is to sort in descending order
- **Custom Sort:** This is for applying various sort criteria in multiple columns.
- Click on **Custom Sort**, then click **Add Level**.



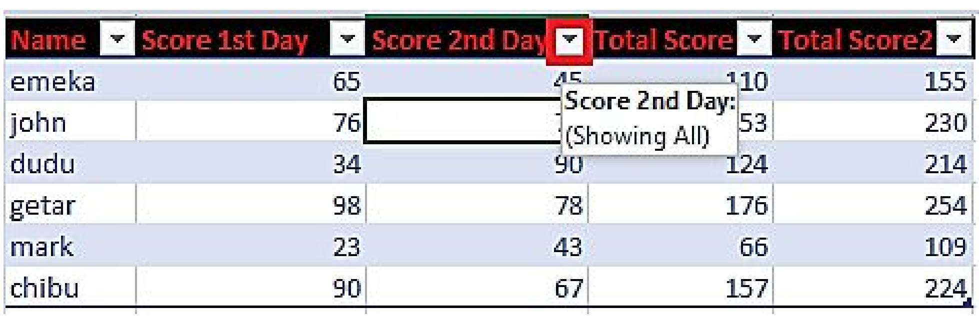
Then, enter in how you want it to be sorted. Once you are done, click Ok.

Filtering table records

Click on cell on your worksheet. On the ribbon, click on the Data tab, then select Filter.

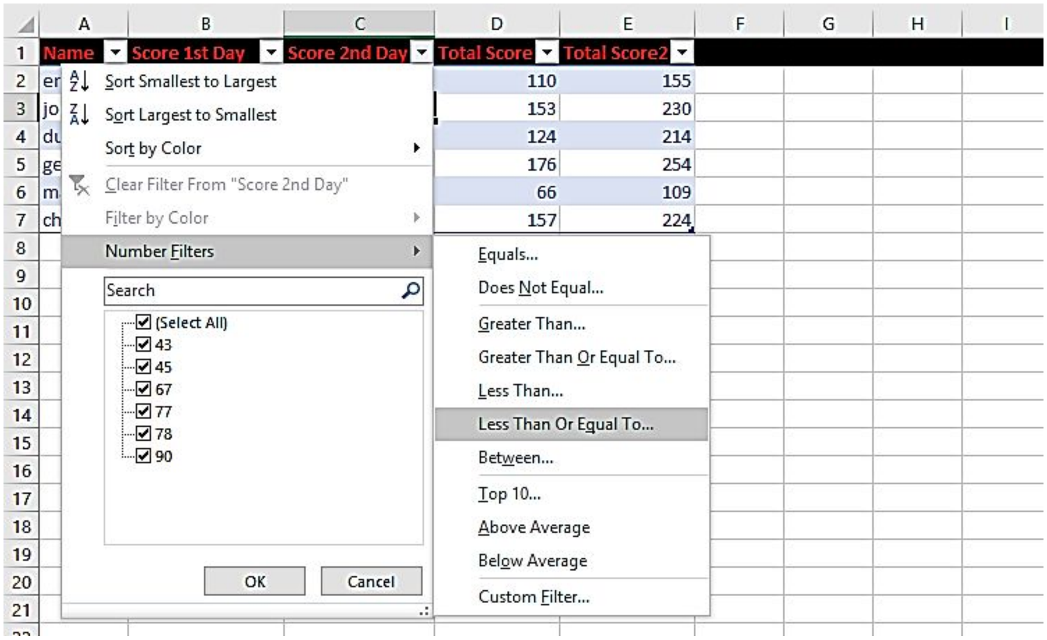


Now, click on the arrow on the column header.



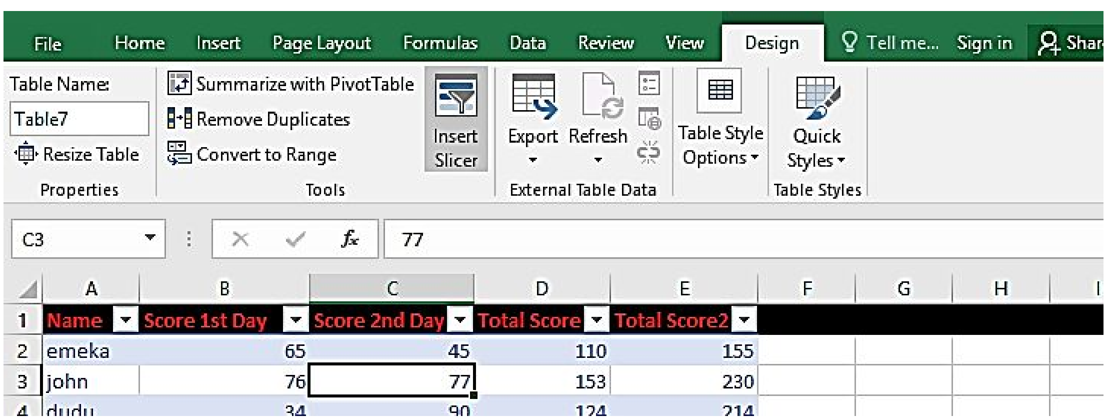
Name	Score 1st Day	Score 2nd Day	Total Score	Total Score2
emeka	65	45	110	155
john	76	[illegible]	[illegible]	230
dudu	34	90	124	214
getar	98	78	176	254
mark	23	43	66	109
chibu	90	67	157	224

Then, click on Number Filters. Select any filter option.

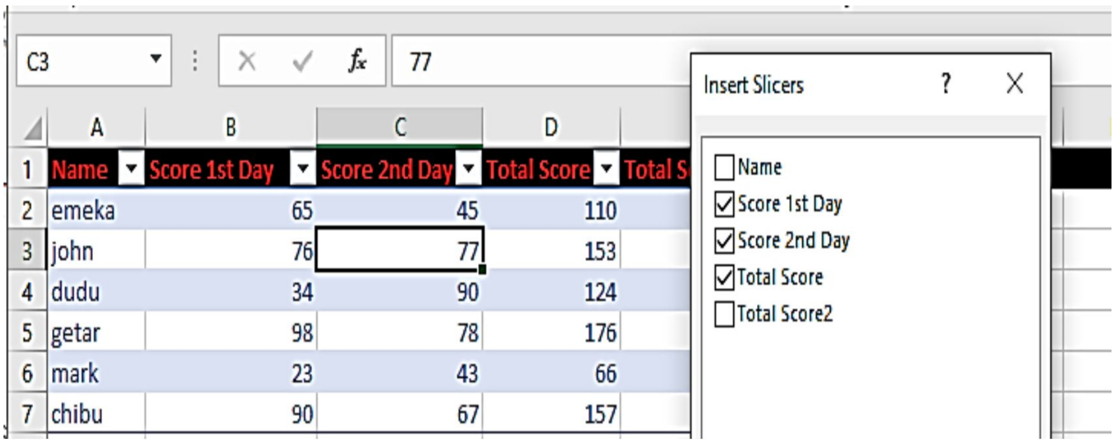


Filtering a table with slicers

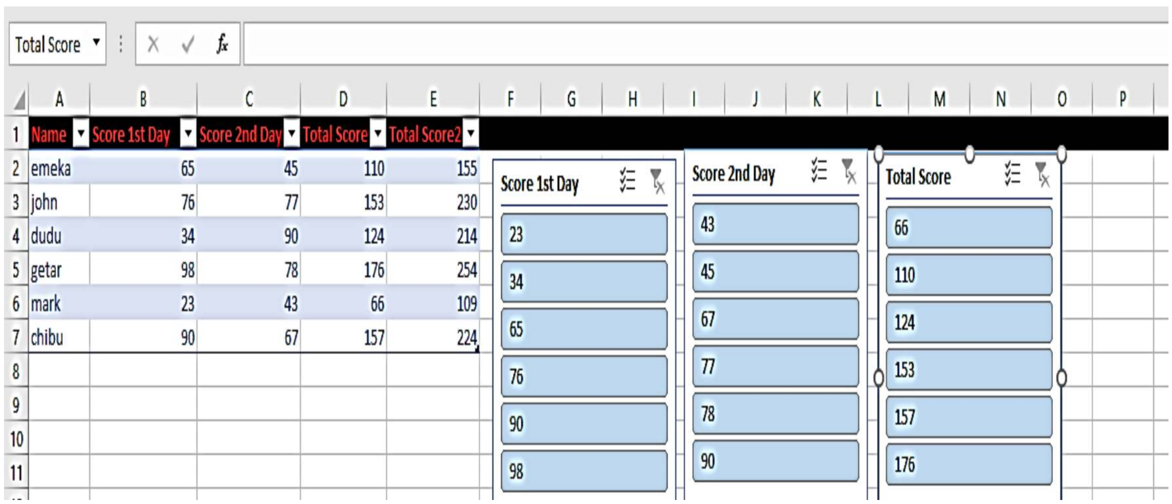
Adding Slicer filters to your tables may dramatically boost the usability of tables by allowing you to filter table data more quickly and simply. Choose the table for filtering. Then, click on Insert Slicer. You can find the Insert Slicer on the Design tab on the ribbon.



When you click on Insert Slicer, it opens up a dialog box. On it, you are to check the boxes of the field in the table in which you want to filter with a slicer.



Then, click Ok.

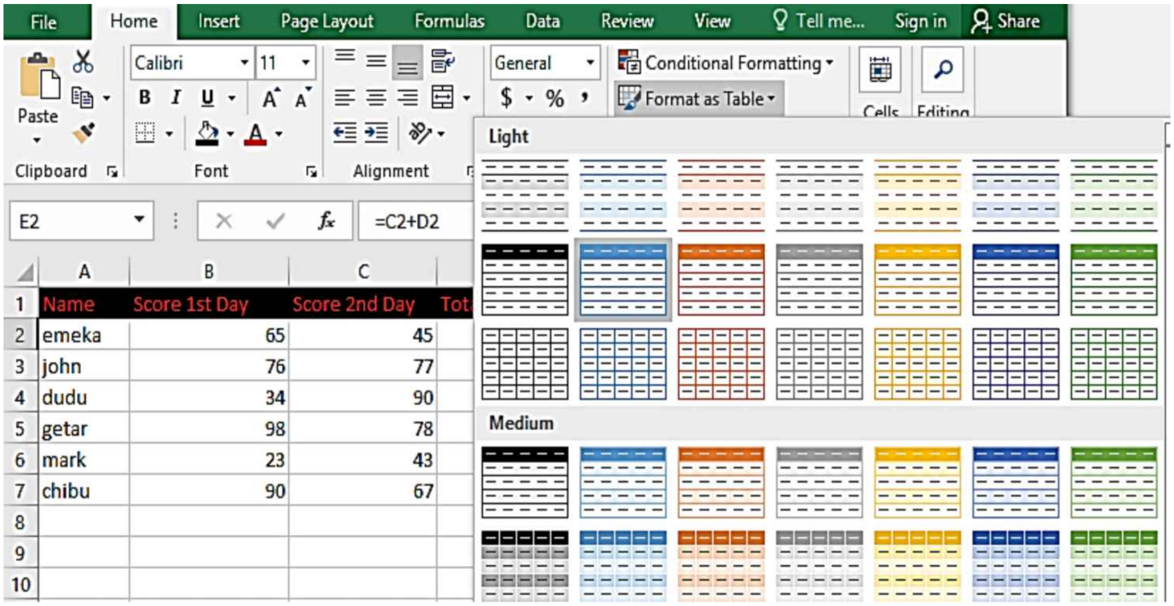


Tables are among Excel's most powerful features, but when you add Slicer filters to them, you significantly increase their use by allowing you and your team to swiftly filter tables without having to utilize the typical drop-down filter environment.

Changing the table's appearance

What's the first thing you'd want to do with an Excel table once you've generated it? Make it appear just how you want it to!

To do this, simply select the table, click on the **Home** tab, then click on **Format as Table**. This will display a menu that consists of some table styles. Choose a style.



Clearing a filter

You can do this with just a click. Simply select the Data Tab and choose Sort and Filter. On the section, select Clear. This will clear all the filters you have applied in that set of data.

You can decide to clear the filter column by column without clearing all the filters in the table at once. You have to select the drop-down menu and select the option "**Clear Filter From".** Then, you select the column you want to clear the filter.

Applying a predefined AutoFilter

Excel AutoFilter is a simple method of converting numbers in excel columns into customized filters depending on cell data. Excel's auto-filter feature allows us to filter our values in one, two, or more fields in one go

We can pulverize our data using Excel AutoFilter to meet our needs. We may filter depending on our selections from a collection or search for the data we're looking for. The rows that do not match the filters' requirements will be omitted.

To put it another way, AutoFilter in Excel enables us to see selected rows in Excel while concealing others. Whenever Excel AutoFilter is applied to the row's heading, a drop-down menu appears in the header row. It gives us a number of filter choices, which we'll go through in this section.

There are multiple AutoFilter options you can work with. They are Contains, Equals to, Does not Contain, Greater Than, Ends with, Less Than, Begin with, and Greater than or equals to. Let’s work on how you can apply the multiple filters.

Select any row header. Click filters on the data tab.

Applying advanced filters

Advanced filter options can be found on the Sort and Filter tab on the Data ribbon. Select the columns for the data for the filter. Then, click on the Advanced filter option. In the dialog box, choose the Action, the List Range, and the Criteria Range. Then press OK. The multiple columns will be filtered.

Conclusion

Excel tables are very important in Excel. They are used in structuring, analyzing, and organizing the data in your worksheet. Ensure that you use the examples given here to structure your data.

CHAPTER FOUR

GRABBING DATA FROM EXTERNAL SOURCES

In several circumstances, the data you wish to examine is stored somewhere other than Excel. That information might be stored in a text or Word document, on a website, in a file or database, in a database application (such as a company financial statements), or on a dedicated database server. Unfortunately, you can't examine anything that would be "available on the market" in a file, software, or website. Rather, you'll need to find out how to get that data "in here," which means importing it into an Excel file and presenting it as an Excel table. Importing data from other sources may be difficult, but Excel has a number of sophisticated tools for doing it.

What is All this about External Data?

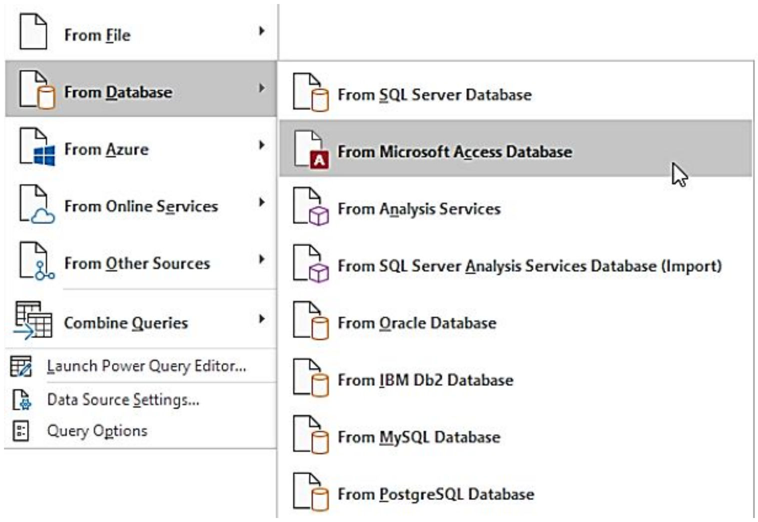
Data that is saved elsewhere, like on a server, is referred to as external data. Utilizing one or more external data linkages, you may import or show data from another source in a worksheet. SQL Server tables, SQL Server Analysis Services cubes, Microsoft Azure Marketplace data, and other external data sources are all instances of external data sources. External data connections in a worksheet allow you to submit queries to and collect information from the databases you choose. This allows you to access the most up-to-date information in a worksheet by refreshing the data.

In Excel, you may utilize native data instead of dealing with external data. Even if an external connection was utilized to load data into a worksheet, native data is saved directly in the workbook and does not need the retention of an external data connection. Directly entering changes or reimporting data into Excel may be used to modify native data.

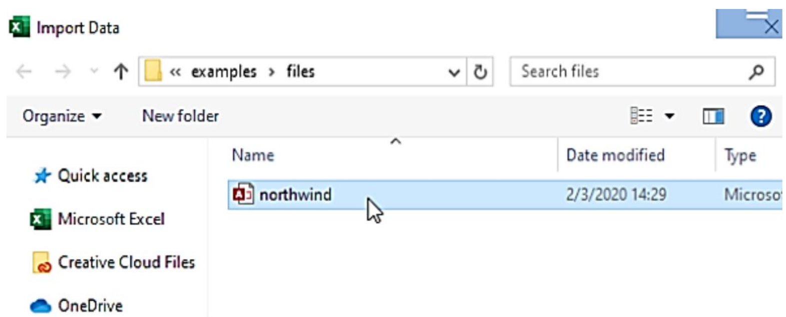
Importing External Data into Excel

Importing data from an Access Table

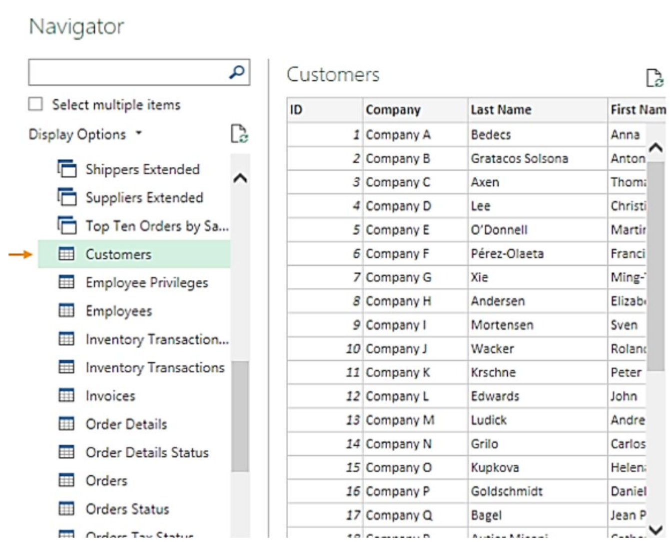
Press the Data Tab and choose Get Data. Then, select **From Microsoft Access Database.**



Then, choose the Access File. Then, click Import.



Choose a Table and click Load.



You will have the table on your worksheet.

ID	Company	Last Name	First Name	E-mail Address	Job Title
1	Company A	Bedecs	Anna		Owner
2	Company B	Gratacos Solsona	Antonio		Owner
3	Company C	Axen	Thomas		Purchasing Represent
4	Company D	Lee	Christina		Purchasing Manager
5	Company E	O'Donnell	Martin		Owner
6	Company F	Pérez-Olaeta	Francisco		Purchasing Manager
7	Company G	Xie	Ming-Yang		Owner
8	Company H	Andersen	Elizabeth		Purchasing Represent
9	Company I	Mortensen	Sven		Purchasing Manager
10	Company J	Wacker	Roland		Purchasing Manager
11	Company K	Krschne	Peter		Purchasing Manager
12	Company L	Edwards	John		Purchasing Manager
13	Company M	Ludick	Andre		Purchasing Represent
14	Company N	Grilo	Carlos		Purchasing Represent
15	Company O	Kupkova	Helena		Purchasing Manager

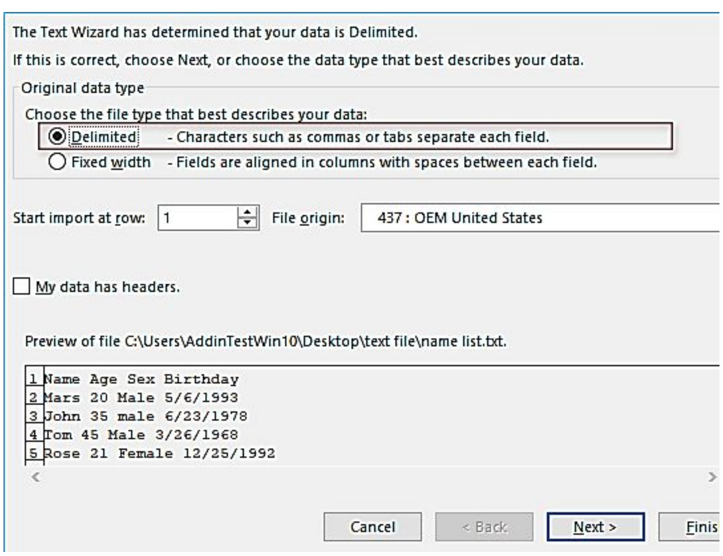
If you Access data modify, click on Refresh on the ribbon.

Importing data from a Word table

- Open the Microsoft Word application. Copy the table in the document. Then, close the app. Navigate to your Excel application and open your workbook.
- Click on the cursor in the first cell grid. Then, press Control key + V. This will paste the data into the worksheet.

You can also convert Word to Excel. This is done using the **From Text** option. To do this, simply open the Word app, then select File and choose Save As. Then, choose Plain Text format from the Save As Type.

Select Save. Now, on the Excel app, click on Data and choose From Text. Choose the Delimited option.



Modify and choose **Finish**. Select a worksheet. It can be a new one or an existing one. Then, choose Import. Press Ok.

Introducing text file importing

You utilize the Excel import wizard to import text files. It goes with lots of processes. Let's move on to how to do so.

Simply select the Data Tab and choose to Get External Data. Pick From Text. You will have things you have to note down when doing this. Your data might be divided by spaces, tabs, colons, or any other characters. This means that you will have to choose Delimited.

You will select Fixed Width if the column in your worksheet is of the same length. Pick a row that will be for the Start import row. On the default option of the File Origin, you can leave it like that. Select the data that will separate your data i.e. if you have delimited data. The Advance button is not really necessary.

Importing a fixed-width text file

- First, choose the content for the importing. It should be in the .txt file. Copy the files.
- Navigate to your Excel sheet\ and paste it. column A should be chosen. After that, move to the Data Tab and choose Text to Column.
- Choose the Fixed Width Format. select Next. Then, make some modifications on the next window and click Finish.

Importing data from a web page

The first thing to do is to connect to the data source. So, copy the link address of the web page. Click on the Data Tab and choose to Get and Transform Data. Choose **From Web.**

Paste the link in the box. Press Ok. The contents of the link will be shown by the navigator window.

Click on Web View. Select the arrow on the Load option and choose Load to. Select existing worksheets. Right-click and choose Edit.

Select Product and choose Transform. Click on the Any Column option and pick Fill then, Down.

Choose Changed Type.

Select Product and choose Transform. Click on the Any Column option and pick Replace Values.

Click Insert.

Importing an XML file

Select the Developers Tab and choose Import. In the dialog box, find the XML file and choose it. then, click Import. You can choose to import in a new worksheet or to an existing worksheet.

Querying External Databases

Defining a data source

Click the Power Pivot option and choose Manage. You will see the different tabs in the Power Pivot Window. The hidden column will be grayed out. If you want to see the table origin, click on the Table Properties option.

In Excel, select Data and choose Connections. Choose the connection and select Properties. Then, pick a Definition.

Conclusion

You can work with the data stored in your file and can also work with other data from external sources. You utilize these data when you have to. There are different ways of importing these data and you have seen them as we have listed them. Select the steps best for you and apply them.

CHAPTER FIVE

ANALYZING TABLE DATA WITH FUNCTIONS

The Database functions execute fundamental operations like Sum, Average, Count, and so on, but they also include criterion parameters that enable you to calculate just a sample of the data in your Database. The Database's other entries are disregarded.

Excel, on the other hand, is so much more capable. It's possible to utilize it to make a huge database, such as an Excel database. Excel's database features are quite strong. Excel may be used not just to construct a basic searchable database, but also to develop a fully relational database.

Excel is made up of rows and columns that store our data, also known as records. Because Excel is the most widely used tool, we store our data in it, which makes it a database. Whenever we put data in excel in the form of tables in rows and columns, it becomes a database.

The Database Functions: Some General Remarks

These database functions do standard computations like sum, average, count, and so forth, but they mostly include criterion parameters that enable you to limit the computation to a portion of your document's entries. The database's remaining entries are disregarded.

To have them in a worksheet, hit the Function Wizard (fx) button on the Formula bar, pick Database from the Select a Category drop-down list box, and afterward hit the function to use or write the Database function straight into the column.

All database functions in Excel have the same syntax, which includes three parameters for data, field, and filters. All arguments must be provided. The data is included in a range of cells. Each column is labeled in the first row of the range.

Summing a column’s Values

This is done using the SUMIF function. The syntax for this formula is SUMIF (range, criteria, [sum_range].

Range: This is the cell range that is to be summed up. They include numbers or names.

Criteria: This is the criteria for the summing up. It can be in form of a number, expressions, text, cell references, or a function.

Sum-range. This is the actual cell to include.

Counting a Column's Values

Whether you're calculating the personnel number of a sector in your company or the quantity of the product sold month after month, counting is an important aspect of data analysis. You may count cells, rows, or columns of data in Excel using a variety of methods.

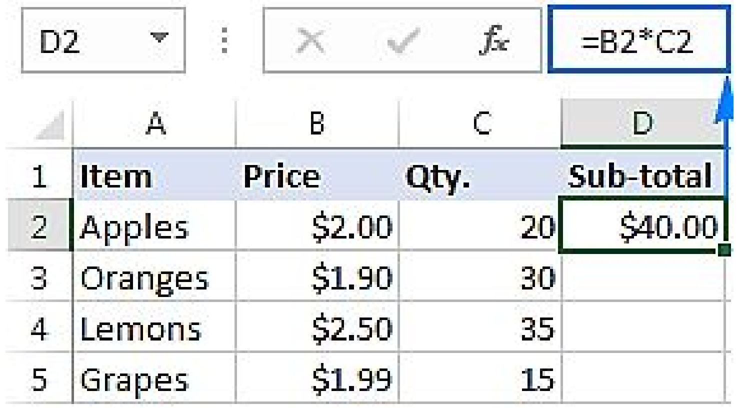
You can count them using a simple formula. It can be done by pressing a button or using a worksheet function. So, simply choose the range of cells in the column that you want to count. Click the formula tab and choose Auto Sum and pick Count Function.

Averaging a Column's Values

This is done using the Average function. The syntax of the formula is **=AVERAGE(number1, [number2],...).** simply put the Average formula in a cell, then put the values of the column that you want to calculate their average. For example, =AVERAGE(100,56,34,566,33,56,67). Then, press enter.

Multiplying a Column's Values

Let's say your data started from the B and C and you want to multiply the columns. You will simply do =B2*C2*.



Then, use the drag and fill option to fill in the other cells in the column.

Conclusion.

Here, I have explained the different ways that you can work with functions on your table data. The examples are well understandable. Ensure that you utilize them.

CHAPTER SIX

CREATING AND USING PIVOT TABLES

Understanding Pivot Tables

A pivot table is a particular Excel feature that enables you to visually analyze and study data. It is a tool that enables you to interactively study vast amounts of data. With a pivot table, you can rapidly turn a large number of rows and columns into a comprehensive, neatly designed report.

A PivotTable is a user-friendly tool for efficiently summarizing vast volumes of data. A PivotTable may be used to study statistical data in-depth and to solve unexpected queries about your information

A PivotTable is particularly useful for:

- Large volumes of data may be queried in a variety of user-friendly methods.
- Numeric data subtotaling and aggregation, data summarization by categories and subcategories, and custom computations and formulae
- Extending and compressing data levels to narrow your findings, as well as diving down to specifics from data collected for fields of interest to you.
- To view alternative representations of the original data, move rows to columns or columns to rows (or "pivot").
- Filtration, sorting, grouping, and conditionally formatting the most relevant and intriguing subset of data, allowing you to concentrate on just the information you need.
- Reports that are succinct, beautiful, and annotated may be presented online or in print.

In essence, Pivot Table extract value from the infinite clutter of data on your computer. And, more particularly, it allows you to organize your data in various ways so that you may readily make useful conclusions.

The "pivot" aspect of a pivot table refers to the ability to twist (or pivot) the data in the worksheet to examine it from a wider viewpoint. To be clear, when you pivot, you are not adding to, removing from, or otherwise affecting your data. Rather, you're merely restructuring the data so that it may be mined for important information.

Exploring Pivot Table features

There are some features that come with a Pivot Table in Excel. Those features help it to function very well.

They are as follows;

Filters: A report filter is used to apply a filter to a table as a whole. Filters are used to conceal certain data.

Columns: Column labels are used to add a filter to one or more columns in the pivot table that must be shown. Values under various situations

Rows: Row labels are used to add a filter to one or more rows in the pivot table that must be shown. Data that is used to specify something.

Values: This generally takes the form of a field with numerical values that may be utilized for various sorts of computations. The total number of data points.

Importance of Pivot Table

When working with data in Microsoft Excel, there are several tools and features available. Pivot tables are an essential feature of Excel that allows you to work with data in several ways. Pivot tables are useful because they enable anybody to filter and retrieve information from the data set they're working with.

Pivot tables enable anybody to see their data from a variety of angles. Users may construct interactive visualizations for anybody viewing them with the help of these pivot tables.

You may construct a pivot table after the data is in Excel. To create a pivot table, highlight all of your data, go to the Insert tab, and choose Pivot table from the drop-down menu. The Pivot Table option gives the user the maximum flexibility with their data, allowing them to investigate all conceivable combinations of their categories. If the user wishes to have Excel present some pivot tables already built with their data, they may click the Recommended Pivot Tables option.

The pivot table dashboard will appear in a new excel sheet once you click OK, and the user will be able to examine all parts of the data.

When the user begins adding items to the filters, rows, columns, and values sections on the right side of the dashboard, the numbers appear on the left side of the dashboard. All of the data's columns appear in the box, and they may be dragged and dropped into any of the four categories.

If you drag anything into the rows field, it will display all of the data from that column in rows on the left side. The same is true if you drag anything into the column field; only the data will appear in columns across the page.

The values field enables the user to get and display data linked with categories in the rows or columns. Finally, the filter field is quite valuable because it allows for the user to split down the data so that they may only view the bits of it that are relevant to them. To the left is a representation of these pivot tables' fundamental functions.

Another useful feature of pivot tables is the large number of functions that can be applied to the data in the columns and rows in real-time.

The pivot table's values may be translated in many ways. The lists on the left are just a few of the many methods to extract essential values from data quickly. Users may retrieve the total amount of numbers in a category, the count, and other statistics that can be utilized to locate crucial data.

If a user wants to make calculations from the data in a column right away, they can do so with just one click on each cell. Instead of typing long formulas into each cell, pivot tables allow you to perform calculations that would otherwise necessitate a long formula in each cell.

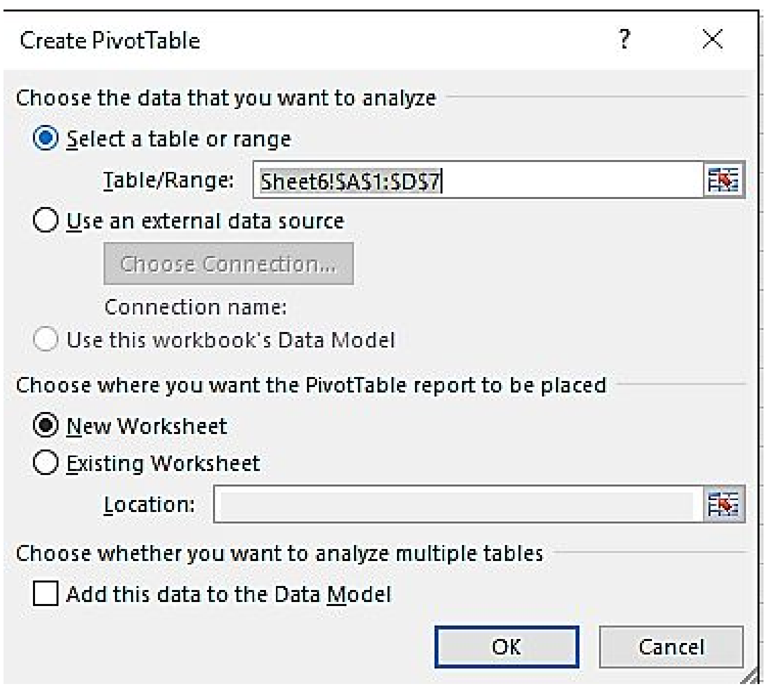
Creating a new field calculated from a function made up of other fields is another intriguing possibility with pivot tables. A user can manipulate different fields in a pivot table by adding, subtracting, multiplying, and dividing them.

Building a pivot table from an Excel Range or Table

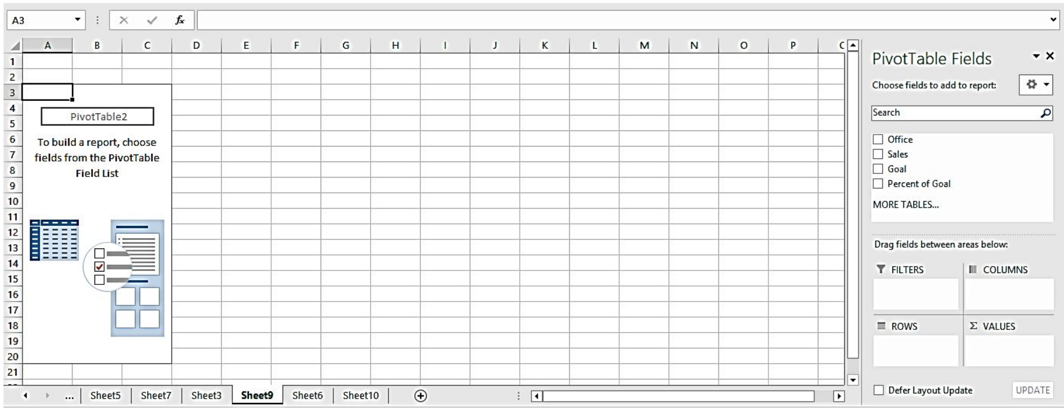
A PivotTable may be created from a set of data or an Excel table. If you know what you're searching for, you may start with a blank PivotTable to add in the specifics. You may also utilize Excel Recommended PivotTables to get an idea of which PivotTable layouts are most appropriate for summarizing your data. It is an easy process to create a Pivot Table in your worksheet. Follow the steps below to do so;

First, chose the cells for the pivot table.

Navigate to the Insert tab and select Pivot Table. Select where you want the pivot table to be placed. Click **Ok**. It is advisable to pick New Worksheet. You can also decide to analyze multiple tables by clicking the boxes on Add this data to the Data Model.



The Pivot table will be created on your worksheet in relation to the data in your new worksheet. It will consist of an empty worksheet. Name the worksheet.

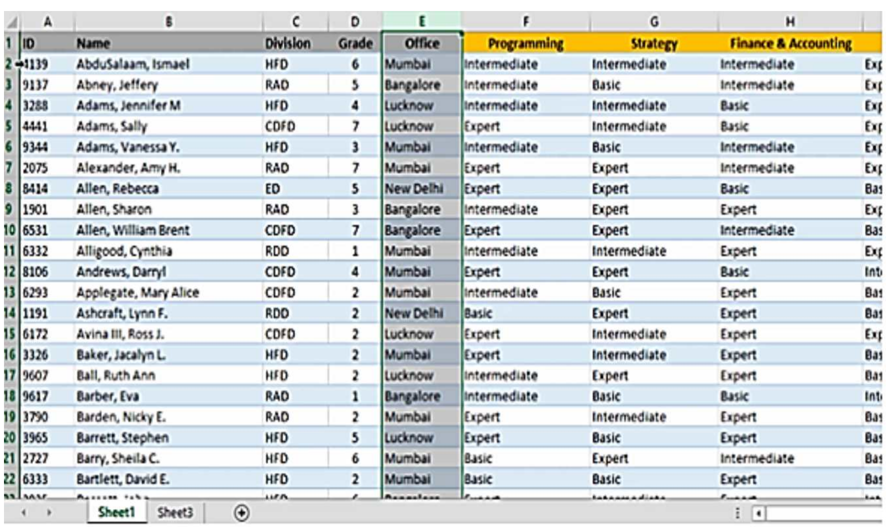


Creating a Pivot Table from External data

Analyzing all of the data may assist you in making better corporate choices. However, it might be difficult to compile a set of ideas, particularly if you have a large amount of data saved outside of Excel, such as in a Microsoft Access or Microsoft SQL Server database or an OLAP cube file. In such a situation, you'll link to the external data source before creating a PivotTable to summarize, analyze, explore, and show the information.

Building a Pivot Table from Microsoft Query

We will work with the dataset below.



ID	Name	Division	Grade	Office	Programming	Strategy	Finance & Accounting
1139	AbduSalaam, Ismael	HFD	6	Mumbai	Intermediate	Intermediate	Intermediate
9137	Abney, Jeffery	RAD	5	Bangalore	Intermediate	Basic	Intermediate
3288	Adams, Jennifer M	HFD	4	Lucknow	Intermediate	Intermediate	Basic
4441	Adams, Sally	CDFD	7	Lucknow	Expert	Intermediate	Basic
9344	Adams, Vanessa Y.	HFD	3	Mumbai	Intermediate	Basic	Intermediate
2075	Alexander, Amy H.	RAD	7	Mumbai	Expert	Expert	Intermediate
8414	Allen, Rebecca	ED	5	New Delhi	Expert	Expert	Basic
1901	Allen, Sharon	RAD	3	Bangalore	Intermediate	Expert	Expert
6531	Allen, William Brent	CDFD	7	Bangalore	Expert	Expert	Intermediate
6332	Alligood, Cynthia	RDD	1	Mumbai	Intermediate	Intermediate	Expert
8106	Andrews, Darryl	CDFD	4	Mumbai	Expert	Expert	Basic
6293	Applegate, Mary Alice	CDFD	2	Mumbai	Intermediate	Basic	Expert
1191	Ashcraft, Lynn F.	RDD	2	New Delhi	Basic	Expert	Expert
6172	Avina III, Ross J.	CDFD	2	Lucknow	Expert	Intermediate	Expert
3326	Baker, Jacalyn L.	HFD	2	Mumbai	Expert	Intermediate	Expert
9607	Ball, Ruth Ann	HFD	2	Lucknow	Intermediate	Expert	Expert
9617	Barber, Eva	RAD	1	Bangalore	Intermediate	Basic	Basic
3790	Barden, Nicky E.	RAD	2	Mumbai	Expert	Intermediate	Expert
3965	Barrett, Stephen	HFD	5	Lucknow	Expert	Basic	Expert
2727	Barry, Sheila C.	HFD	6	Mumbai	Basic	Expert	Intermediate
6333	Bartlett, David E.	HFD	2	Mumbai	Basic	Basic	Expert

Because this dataset isn't put up in a precise format, creating a pivot table from it would be difficult. The dataset should be organized in the manner described below. However, executing this procedure manually would take a long time. However, you can simplify this procedure using Power Query.

	ID	Name	Division	Grade	Office	Attribute	Value	H
2	4139	AbduSalaam, Ismael	HFD	6	Mumbai	Programming	Intermediate	
3	4139	AbduSalaam, Ismael	HFD	6	Mumbai	Strategy	Intermediate	
4	4139	AbduSalaam, Ismael	HFD	6	Mumbai	Finance & Accounting	Intermediate	
5	4139	AbduSalaam, Ismael	HFD	6	Mumbai	Communication	Expert	
6	4139	AbduSalaam, Ismael	HFD	6	Mumbai	Legal	Intermediate	
7	9137	Abney, Jeffery	RAD	5	Bangalore	Programming	Intermediate	
8	9137	Abney, Jeffery	RAD	5	Bangalore	Strategy	Basic	
9	9137	Abney, Jeffery	RAD	5	Bangalore	Finance & Accounting	Intermediate	
10	9137	Abney, Jeffery	RAD	5	Bangalore	Communication	Expert	
11	9137	Abney, Jeffery	RAD	5	Bangalore	Legal	Expert	
12	3288	Adams, Jennifer M	HFD	4	Lucknow	Programming	Intermediate	
13	3288	Adams, Jennifer M	HFD	4	Lucknow	Strategy	Intermediate	
14	3288	Adams, Jennifer M	HFD	4	Lucknow	Finance & Accounting	Basic	
15	3288	Adams, Jennifer M	HFD	4	Lucknow	Communication	Expert	
16	3288	Adams, Jennifer M	HFD	4	Lucknow	Legal	Expert	
17	4441	Adams, Sally	CDFD	7	Lucknow	Programming	Expert	
18	4441	Adams, Sally	CDFD	7	Lucknow	Strategy	Intermediate	
19	4441	Adams, Sally	CDFD	7	Lucknow	Finance & Accounting	Basic	
20	4441	Adams, Sally	CDFD	7	Lucknow	Communication	Expert	
21	4441	Adams, Sally	CDFD	7	Lucknow	Legal	Expert	
22	9344	Adams, Vanessa Y.	HFD	3	Mumbai	Programming	Intermediate	
23	9344	Adams, Vanessa Y.	HFD	3	Mumbai	Strategy	Basic	

Sheet1 Sheet3

Follow the steps below to do so;

Choose the source of your data by clicking on Power Query. You must choose "**From Table**" if your data is already in the Excel file. If you don't want to use CSV files, you may choose data from other sources.

In most cases, the first row is utilized as a header. Agencies, months, and so on should be utilized as headers in the instance above. When they're not already being utilized as headers, just go to Transforms and choose "**Use First Row as Headers**."

Afterward, you must choose the columns that will be placed below one another. I want the months to be in that manner, so choose the columns "**Jan**" through "**Dec**."

After that, choose to Transform and then "**Unpivot Columns**."

Your information has been updated. If you don't like the alteration, you may simply reverse the steps.

This data collection must now be saved. "**Close and Load To**" is selected from the File menu. Make a new spreadsheet and save the data set that has been updated.

You may now utilize your data in a Pivot Table. You may now quickly build a Pivot Table from the Insert menu, selecting any features you want in your table for fast data comparison and analysis.

Building a Pivot Table from a New data connection

On the Data tab, choose **From Other Sources**. Then choose the connection you want from the sources list. In the **Data Connection Wizard** box, enter the server for the database and put how you wish to log on to the server.

Enter the database, table, and query that has the data you want. Then, enter the connection file you want to create.

Refreshing Pivot Table Data

When data in the PivotTable source list is modified, the PivotTable does not immediately recalculate.

Below are some reasons why you might need to refresh an Excel Pivot Table:

- When the data structure changes, the pivot table must be refreshed.
- At a later time, a source data variable is changed or modified.
- More rows are included in the basic pivot table data set.
- Existing rows in the source data used as a source for the Pivot Table are removed, or
- The fresh data entering from the sources (SAP, ERP, upstream data sources) varies as the day, week, month, or quarter changes.

So, if you create a pivot table to evaluate data and afterward the data changes after several days or weeks, you need not recreate the Pivot Table. You just need to refresh it. There are different ways you can refresh a pivot table.

1. Existing Data, the values vary considerably, while the numbers of rows of data remain constant.

The data is changed first in this approach.

- Navigate to the Pivot Table. Right-click within the Pivot and select Refresh.
- The Pivot Table is instantly updated. Use this simple method whenever the source data alters.
- In the Excel Ribbon, you may also pick the Refresh All button.

2. The size of the data in Excel changes

New rows or columns are added to the data collection, but this new data is not represented in the pivot table. In this scenario, we must change the pivot table's data range source to include the most recent data rows and columns. There are a few options for doing this.

A. When your pivot table is reliant on data in a variety of cells, such as cells B1:H50, you must increase that range to cover more rows and columns.

The simplest method is to go to the Pivot Table Analyze Tab and select the Change Data Source choice button. The current data range from the source will be indicated (highlighted). Re-select the new data range and choose the OK button.

After it is done, click the Refresh All option to refresh the data from the newly chosen rows/columns and update the pivot. The pivot table will quickly be refreshed.

B. The process is considerably simpler if your pivot table is based on a Table, such as Pricing Table, Table1, and has been turned into a Table.

C. All you have to do is click the Refresh button under the Analyze Tab, and the pivot table will be instantly refreshed.

To use a Table as a data source for a Pivot Table is a smart technique that you should use more often. When generating a new pivot table, it utilizes the whole Excel table, and any additional rows added or deleted afterward are automatically regarded as part of the Pivot Table.

Refreshing Pivot Table Data Manually

To bring up the PivotTable Tools on the ribbon, click anywhere in the PivotTable.

- Press Alt key + F5 or select Analyze, then Refresh.

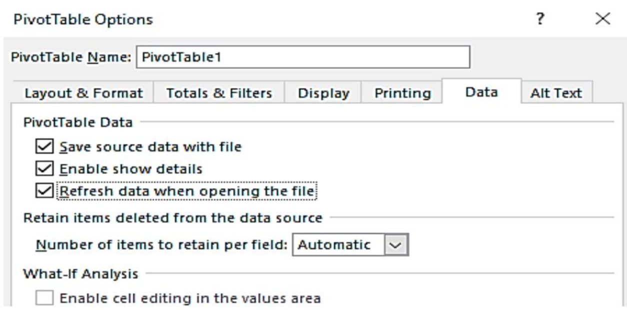
Hint: Pick Analyze and pick Refresh All to update all PivotTables in your worksheet in one go.

Whenever refreshing takes much longer, verify the refresh progress by going to Analyze, then, select Refresh arrow, and choose Refresh Status.

- Tap Cancel Refresh to halt the refresh.

Refreshing Pivot Table data automatically

You may also choose to have your PivotTables update every time you open the worksheet. On the Options tab, click the Options button, and then on the Data tab, check the box next to Refresh data upon opening the file.



Adding multiple fields to a pivot table area

- On your worksheet that contains the PivotTable, then, click on any of the cells in the pivot table area to open the Pivot Table Wizard.
- Choose the column label selected. Then, drag and drop it into the Row Labels section.
- Now, rearrange the field labels in the Row Labels section. You will see some modifications on the Pivot Table. Choose how you want to order the row labels.
- Review the Page Layout for the worksheet.

Pivoting a field to a different area

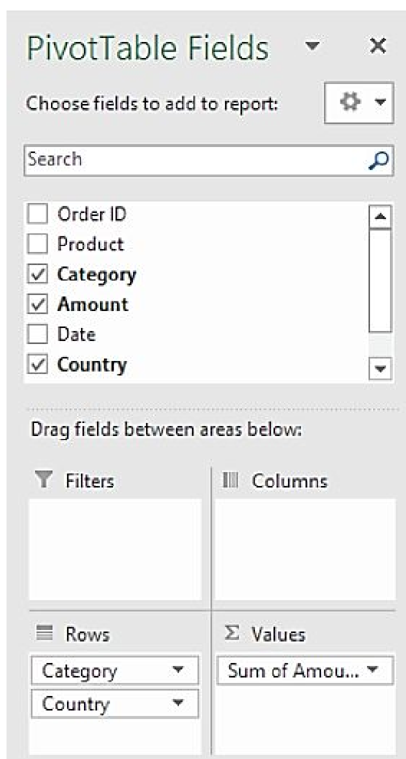
You can drag multiple fields to an area in a pivot table. Here, we will work with different fields and will be working with the image below. The fields we will work with are Multiple Row Fields, Multiple Value Fields, and Multiple Report Filter.

	A	B	C	D	E	F	G	H
1	Order ID	Product	Category	Amount	Date	Country		
2	1	Carrots	Vegetables	$4,270	1/6/2016	United States		
3	2	Broccoli	Vegetables	$8,239	1/7/2016	United Kingdom		
4	3	Banana	Fruit	$617	1/8/2016	United States		
5	4	Banana	Fruit	$8,384	1/10/2016	Canada		
6	5	Beans	Vegetables	$2,626	1/10/2016	Germany		
7	6	Orange	Fruit	$3,610	1/11/2016	United States		
8	7	Broccoli	Vegetables	$9,062	1/11/2016	Australia		
9	8	Banana	Fruit	$6,906	1/16/2016	New Zealand		
10	9	Apple	Fruit	$2,417	1/16/2016	France		

Multiple Row Fields

After inserting the Pivot table, you can drag the filed below to the different areas;

- Drag the Country field and the Category field to the Rows area
- Drag the Amount Field to the Values area



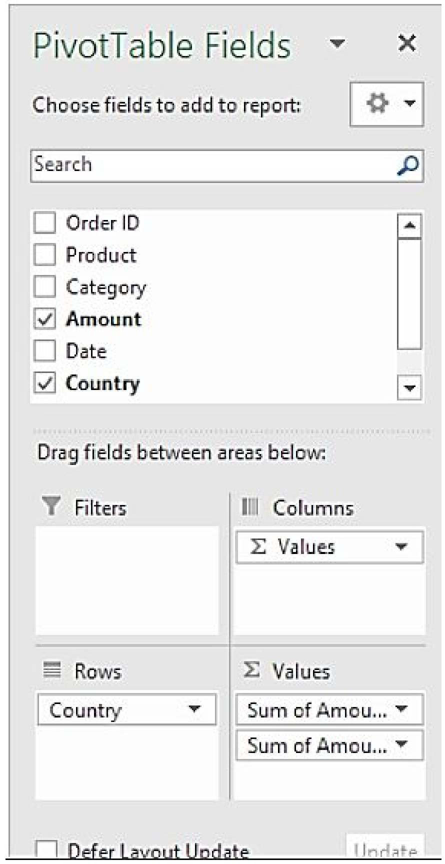
You will find the multi-level pivot table.

	A	B	C
1			
2			
3	Row Labels	Sum of Amount	
4	⊟Fruit	693069	
5	Australia	91221	
6	Canada	82338	
7	France	125931	
8	Germany	66430	
9	New Zealand	62392	
10	United Kingdom	87786	
11	United States	176971	
12	⊟Vegetables	336665	
13	Australia	40492	
14	Canada	12407	
15	France	15125	
16	Germany	88738	
17	New Zealand	4390	
18	United Kingdom	85351	
19	United States	90162	
20	Grand Total	1029734	

Multiple Value Fields

After inserting the pivot table, you drag the fields below to the different areas;

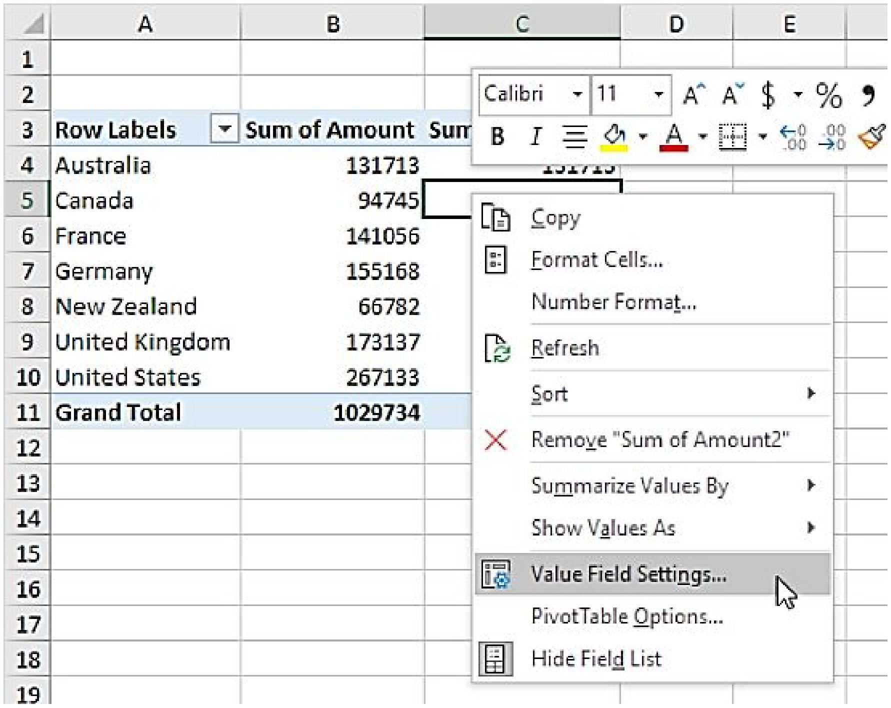
- Drag the Country field to the Rows area
- Drag the Amount field to the Values Area (two times).



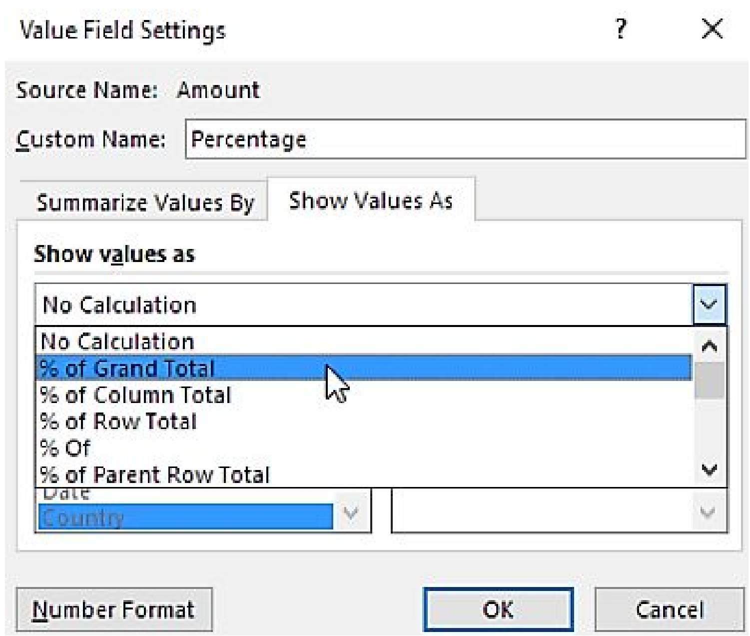
We drag the Amount field to the Values area twice, and whenever you do that, Excel will populate the Columns area.

	A	B	C	D
1				
2				
3	**Row Labels**	**Sum of Amount**	**Sum of Amount2**	
4	Australia	131713	131713	
5	Canada	94745	94745	
6	France	141056	141056	
7	Germany	155168	155168	
8	New Zealand	66782	66782	
9	United Kingdom	173137	173137	
10	United States	267133	267133	
11	**Grand Total**	**1029734**	**1029734**	

Now, select any cell in the Sum of Amount2 column and right-click and pick Value Field Settings.



Put in the percentage on the box next to Custom Name. Pick a percentage of Grand Total in the Show Values As tab option.



Select Ok.

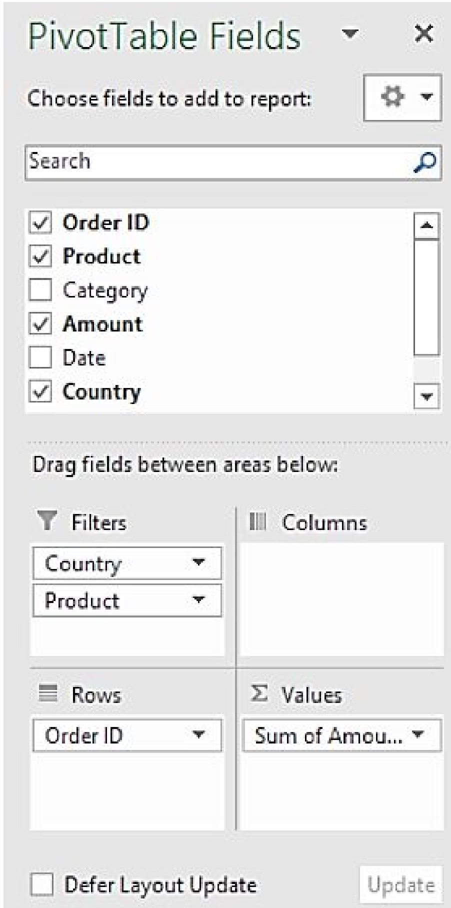
Your outcome will be as seen below;

	A	B	C	D
1				
2				
3	**Row Labels**	**Sum of Amount**	**Percentage**	
4	Australia	131713	12.79%	
5	Canada	94745	9.20%	
6	France	141056	13.70%	
7	Germany	155168	15.07%	
8	New Zealand	66782	6.49%	
9	United Kingdom	173137	16.81%	
10	United States	267133	25.94%	
11	**Grand Total**	**1029734**	**100.00%**	

Multiple Report Filter Fields

After inserting the pivot table, then you drag the fields below to the different areas.

- Drag the Country field as well as the Product field to the Filters area
- Drag the Amount field to the Values area
- Drag the Order ID to the Rows area.



Now, choose on the first filter drop-down menu, pick the United Kingdom. On the second one, pick Broccoli. The pivot table will display the order made by Broccoli to the United Kingdom.

	A	B	C
1	Country	United Kingdom	
2	Product	Broccoli	
3			
4	**Row Labels**	**Sum of Amount**	
5	2	8239	
6	19	3595	
7	86	2054	
8	92	2011	
9	112	7231	
10	121	6343	
11	126	3027	
12	163	5936	
13	**Grand Total**	**38436**	
14			

Grouping pivot table values

Large volumes of data may be readily summarized, analyzed, and presented using pivot tables. To do so effectively, you must first be able to arrange the data into suitably sized and ordered subgroups. You can easily achieve this using Pivot Tables' grouping and ungrouping functionalities.

Understanding how to arrange data quickly in a PivotTable report may be really beneficial. This is due to the fact that it makes it simple to organize a large quantity of diverse data into a few categories or subcategories. Fewer groups enable you to streamline your assessment and concentrate on the most important (grouped) things.

You can group numeric values, date and time values, and text values. Below is the way you can do them.

Grouping Records

1. Right-click a value in the PivotTable and choose Group.
2. Choose the Starting at and Ending at checkboxes in the Grouping box, then modify the values as necessary.
3. Select a period of time under By. Add a number that determines the intervals for each group in mathematical fields.
4. Choose OK.

Grouping selected data

1. Select two or more values while holding the Control Key
2. Select Group from the context menu by right-clicking.

Assigning a name to a group

1. Choose a group.
2. Select Analyze. Then, pick Field Settings from the drop-down menu.
3. Select OK after changing the Custom Name to whatever you like.

Ungrouping data

1. Any item in the group may be selected by right-clicking it.
2. Choose Ungroup.

Error troubleshooting (grouping)

Whenever you attempt to group a selection, you may get an error message stating that you are unable to do so. This could happen for a variety of reasons. Being that you must pick two additional entries to establish a group if you want to group data within your own custom groups; you cannot construct a group with just one item.

You will have an error notice if there are empty cells in a field, such as a date or a number field. If you have a text input in a date or number field, you will get an error. Examine the actual data and rectify the issue in each instance, then reload the PivotTable prior to actually attempting again.

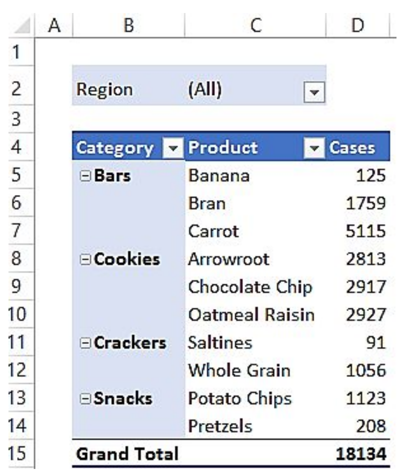
Filtering pivot table values

Applying a report filter

Select the field that is to be used as a Report Filter. Choose the field in the Pivot Table Field List. Drag the field inside the Filters box.

Excel will put the selected field to the top of the pivot table on your worksheet. There will be no changes to the values in the pivot table.

In my image below, I added the Region filed as the Report Filter, and you can see that it is displayed at the top of the pivot table. You can add more than one field as the report filter by following the same steps above.

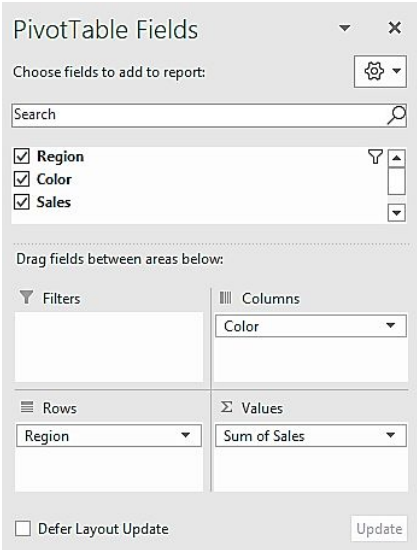


	A	B	C	D
1				
2		Region	(All)	
3				
4		Category	Product	Cases
5		⊟Bars	Banana	125
6			Bran	1759
7			Carrot	5115
8		⊟Cookies	Arrowroot	2813
9			Chocolate Chip	2917
10			Oatmeal Raisin	2927
11		⊟Crackers	Saltines	91
12			Whole Grain	1056
13		⊟Snacks	Potato Chips	1123
14			Pretzels	208
15		Grand Total		18134

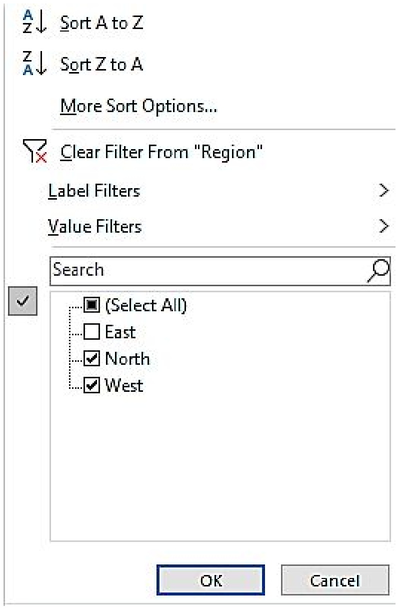
Filtering row or column items

When you apply a filter to a Pivot Table, you may notice that rows or columns vanish. It's because pivot tables only show items that have data by default. A filter has already been added to the East area in the sample given. Since there are no entries for Blue in the North or West areas, the Blue column would typically vanish. Blue, on the other hand, is still visible since the color field settings have been configured to "display things with no data," as detailed below.

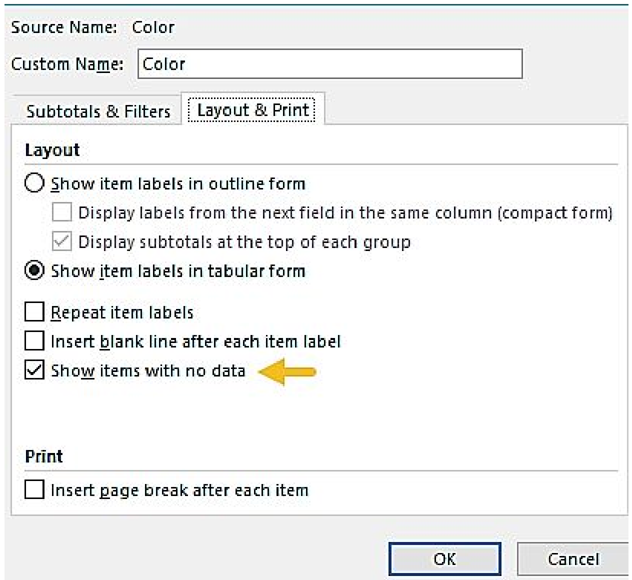
The image below shows three fields which are Region, Color, and Sales.



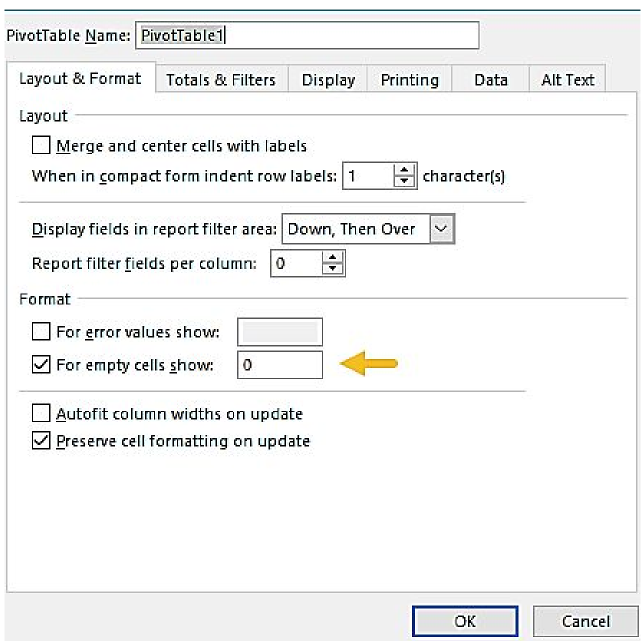
The Row field is now the Region, the Column field is the Color, and the Value field is the Sales.



To enable the display of items that has no data, click on the box next to the **Show items with no data option.**

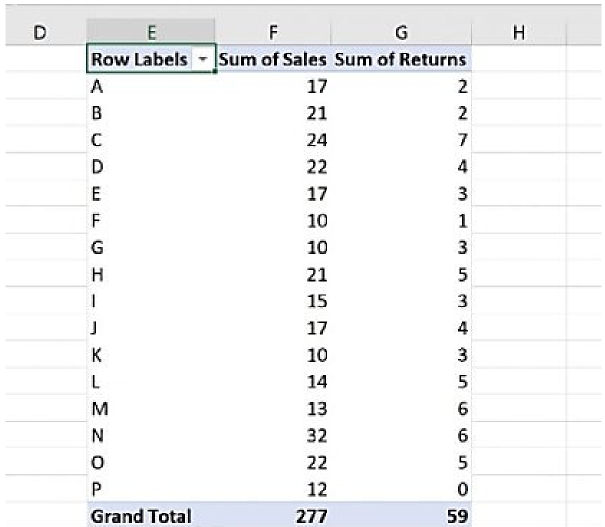


If you want it to display zero when they are no data in it, enter zero on the box at the right side of the **For empty cells show** option.



Filtering pivot table values

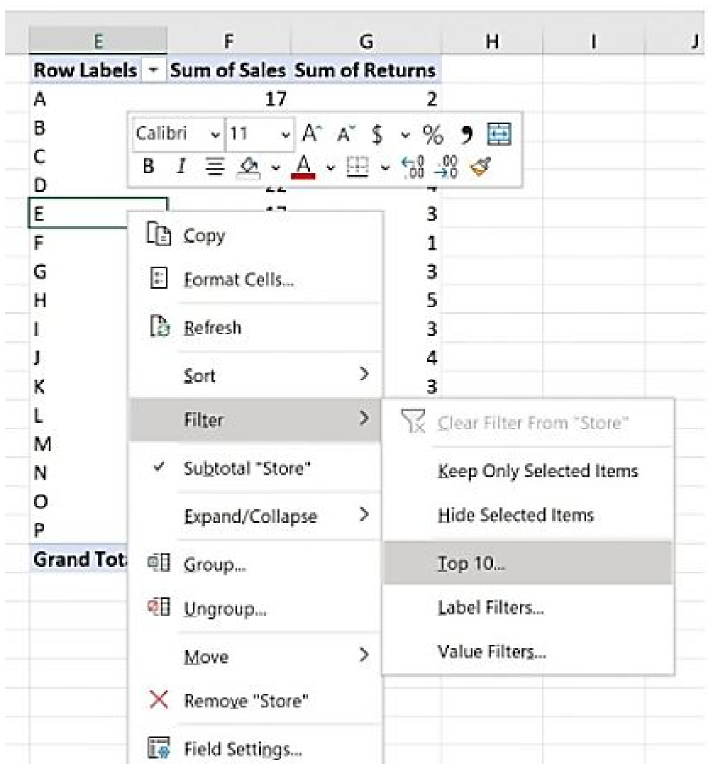
We will be working with the pivot table below. We are going to filter the top values in the pivot table.



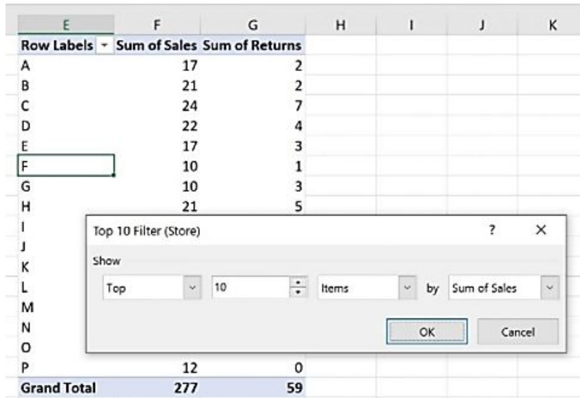
Row Labels	Sum of Sales	Sum of Returns
A	17	2
B	21	2
C	24	7
D	22	4
E	17	3
F	10	1
G	10	3
H	21	5
I	15	3
J	17	4
K	10	3
L	14	5
M	13	6
N	32	6
O	22	5
P	12	0
Grand Total	277	59

We want to make the top ten stores with the highest values in the Sum of Sales section to display. To do this,

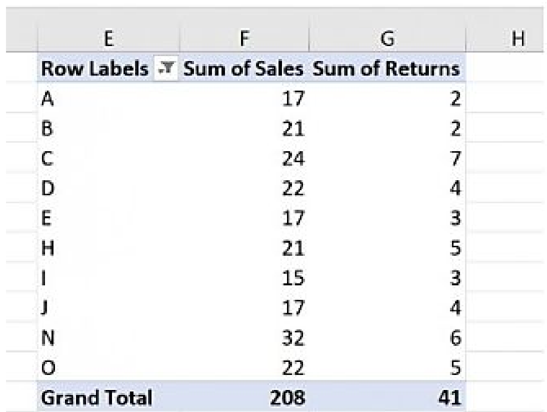
Simply right-click on any of the names for the stores. Select Filter and choose Top 10.



In the next box that shows, choose the top 10 items by Sum of Sales. After that, choose Ok.

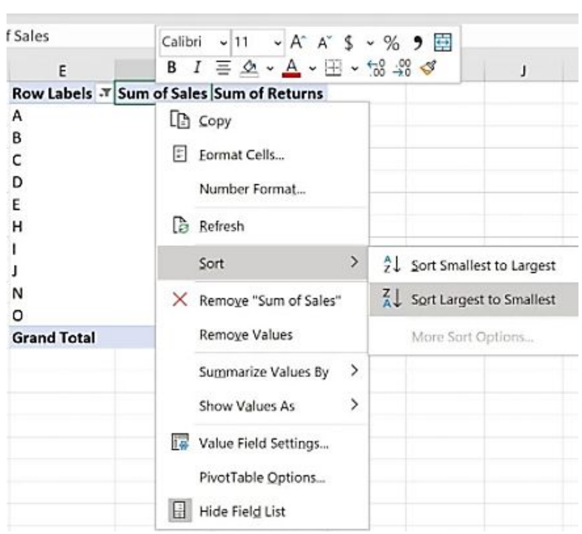


The top 10 values will be filtered immediately



Row Labels	Sum of Sales	Sum of Returns
A	17	2
B	21	2
C	24	7
D	22	4
E	17	3
H	21	5
I	15	3
J	17	4
N	32	6
O	22	5
Grand Total	208	41

In the image above, you will figure out that the top 10 values are displayed but it didn’t show them to be in an arranged order. So, we will sort it out. Simply. Right-click and select Sort. Then, choose Sort Largest to Smallest.



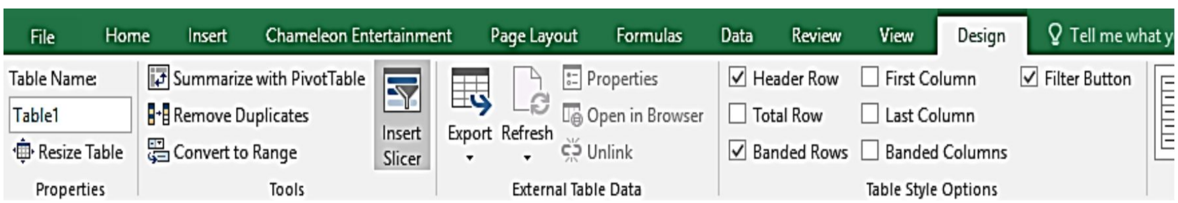
The values will now be arranged from the largest to the smallest.

Row Labels	Sum of Sales	Sum of Returns
N	32	6
C	24	7
O	22	5
D	22	4
B	21	2
H	21	5
A	17	2
J	17	4
E	17	3
I	15	3
Grand Total	208	41

Filtering a pivot table with a slicer.

To add a slicer to a table, your data must be organized in an Excel table. Select a cell within your data and navigate to the Insert menu and choose Table to build an Excel table.

When your data is now in a table, a tab will be shown. On the Table Design tab, select **Insert Slicer**.



It will bring up the Insert Slicer box, where you can choose whatever fields in your data you wish to add a slicer to.

To generate many slicer objects at once, pick one or much more fields out from the list. You'll be capable of utilizing them both at the same time to sort data depending on different fields.

If you press OK, Excel will automatically construct the slicer objects.

Adding a Slicer to a Pivot Table

1. Simply, choose the pivot table for the slicer. Navigate to the **Pivot Table Analyze** tab and select Insert Slicers.
2. Then, choose the fields to add. Click Ok.

Conclusion

This chapter simply explained what a pivot table is all about. As you were reading through, you got to know about the meaning, parts, and importance of a pivot table. With pivot table. You can efficiently carry out several tasks. The examples you have understood in this chapter on how to use the pivot table effectively will guide you through for you to avoid errors.

CHAPTER SEVEN

PERFORMING PIVOT TABLE CALCULATIONS

When using pivot tables to analyze data, you'll often have to extend your analysis to incorporate data from computations that weren't included in your initial data set. Calculated fields and calculated items in Excel allow you to do calculations inside a pivot table.

Messing around with Pivot Table summary calculations

Excel provides several techniques for summarizing your data in the Pivot table. Sum, Count, and Average are some of its summary capabilities.

If you insert a field in the Values section of the field list pane, the value in the column is instantly summed. The Sum function is the standard summary function for the PivotTable's arithmetic value fields, but you may change it.

- In the PivotTable, on the Grand Total field, right-click on it and select Summarize Values By.
- Choose the function that you want to use from the drop-down menu.

Below are the summarized options that you can use alongside the function:

- **SUM**: The standard adding function. It adds up the details in the column. It is the basic function for numerical value fields in value fields. When the sum method is used, all empty or non-numeric variables in the PivotTable are set to 0 so that they may be totaled.
- **COUNT**: It shows the total number of non-empty values. It is the standard value for value fields that include non-numeric data or spaces.
- **AVERAGE**: With this, the average of the provided data is shown.
- **MAX**: With this, the highest value is shown.
- **MIN**: With this, the lowest value is shown.
- **PRODUCT**: With this, the composite of the values is shown.

- **StDev**: An estimation of a population's standard deviation, when the sample represents a portion of the total population.
- **StDevp**: The population standard deviation, in which the population is all the other data to be summed.
- **VAR**: It provides an estimation of a population's variation, where the sampling is a portion of the full population.
- **VARP**: It shows the variation of a population, in which the population is the total amount of data to be evaluated.
- **Distinct Count**: It shows the number of distinct values. This summary feature is only available in Excel when you utilize the Data Model.

Changing the Pivot table summary calculations

The values in the Values box in the PivotChart report describe the actual source data (not the value that is shown) in the usual sequence: The SUM function is used for numeric data, whereas the COUNT function is used for text values. You may, however, alter the summary function. You may also make a custom computation if you want to. Follow the steps below to do so:

- Pick a field in the Values area. This is where you would want to modify the function in the Pivot Table report.
- Navigate to the **Analyze tab** and pick **Active Field** from the **Active Field** group. Then, hit Field Settings.
- This opens the **Value Field Settings** box. The field name in the data source will be the Source name. The Custom name shows the present name in the report. It will show the source name when there is no custom name.
- To modify the Custom name, simply hit the box and change the name.
- Now, select the **Summarize Values By** tab, and on the box, pick the summary function that you wish to utilize.
- You can decide to utilize a custom calculation by clicking the **Show Values As** tab and choosing the calculation you want.
- If the **Base Field** option is shown in the calculation you picked, choose the **Base item**.
- To modify the numbers, pick the Number Format from the Number Tab. Choose a format type and press Ok.

When your report has more than one/two value fields, just repeat the steps above for each of them.

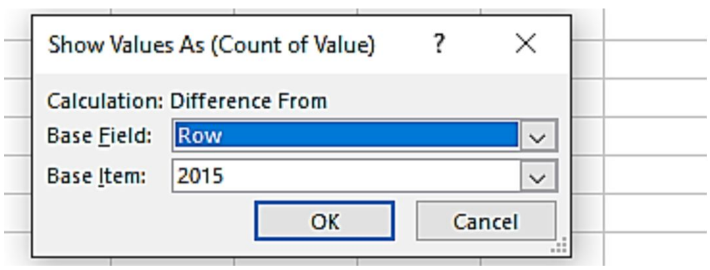
Trying out the difference summary calculation

We will be working with the sample below;

	A	B	C	D	E
1					
2					
3	Sum of Units	Region			
4	Date	Central	East	West	Grand Total
5	2-Sep	1,349	1,672	2,043	5,064
6	9-Sep	1,218	1,899	2,562	5,679
7	16-Sep	1,957	1,782	2,967	6,706
8	Grand Total	4,524	5,353	7,572	17,449

To show the differences, simply right-click and choose **Show Value As**, then click **Difference From**.

Then, choose the Basic Field and Item. Press Ok.



Applying a percentage summary calculation

Several designed percentage calculations are available in the Pivot Table's "**Show Values As**" option. We would like to understand how to evaluate quantities in calculations using Pivot Table percentages rather than Totals in a sales collection of various cigarette brands in various locations.

Percentage of Grand Total

To evaluate each number to the grand total value in Pivot Table percentages, we utilize the percent of Grand Totals computation. Branding is put in the Row area, Areas in the Column area, and Sales Amounts in the Value area of our Pivot Table. We wish to compare the proportion of each brand's sales in each location to the total sales of all brands across all regions.

To alter the sales amount of each brand as a percentage of the Grand Total, we perform the following:

1. Click the right mouse button on any of the brand's sales amount cells.
2. Select Show Values as
3. Choose Percentage of Grand Total

Percentage of Column total

The percentage of Column Total calculation compares every value to the total of a column value and displays the result in Pivot Table percentages as a percentage of column total.

To display the proportion of sales for each brand inside each area, just do the following steps in your Pivot table:

1. Select any of the brand's sales amount cells using the right mouse button.
2. Pick Show Values As
3. Choose the percentage of Column Total from the Show Values As drop-down menu.

Use this same method to display the percentage of the row total as well.

Adding a running total summary calculation

In a pivot table, a running total is a total sum that also includes the previous total. If we have month-by-month data from January to December, for instance, a running total will display you the YTD total every month.

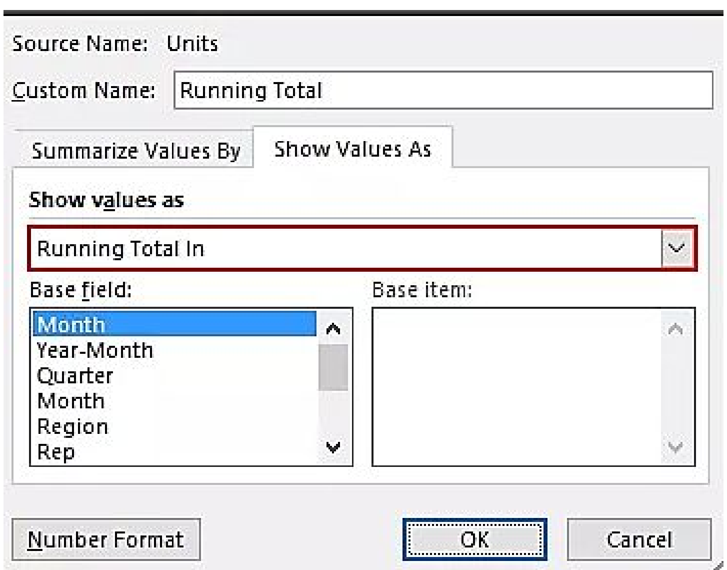
Month	Quantity	Running Tota
Jan	145	145
Feb	63	208
Mar	56	264
Apr	135	399
May	87	486
Jun	150	636
Jul	110	746
Aug	35	781
Sep	18	799
Oct	92	891
Nov	111	1002
Dec	141	1143
Grand Total	**1143**	

We can utilize a running total to calculate the full development against the target. Follow the steps below to add a running total.

After creating the Pivot Table, choose a cell from any column.

Then, you right-click and pick **Value Field Settings**. the window will display.

Navigate to the **Show Value As** tab. Then, pick **Running Total In**.



Select Ok. You will have the running total in your pivot table.

Month	Running Total
Jan	145
Feb	208
Mar	264
Apr	399
May	486
Jun	636
Jul	746
Aug	781
Sep	799
Oct	891
Nov	1002
Dec	1143
Grand Total	

Ensure that the pivot table is sorted correctly before adding the running total. If we wish to add it from January to December, the data must be in that order.

Creating an index summary calculation

One amazing feature of Excel is the ability to display data as the Index in a Pivot Table. The Index describes the comparative relevance of a cell, i.e., the comparative significance of each number in relation to its row, column, and grand total.

It may assist you in making choices if, for instance, you would want to raise the cost of the goods and want to know which areas would be most affected (based on the Index).

Simply right-click and select Show Value As. Then, choose Index. The Index summary calculation will display in your pivot table.

Working with Pivot Table Subtotals

Subtotals are included in your pivot table automatically. It is done whenever you put more fields beneath them. One of the fields does not display subtotals and that is the innermost field. It is not a big deal because you can make them display if you want. You can do this by generating a pivot table custom subtotals.

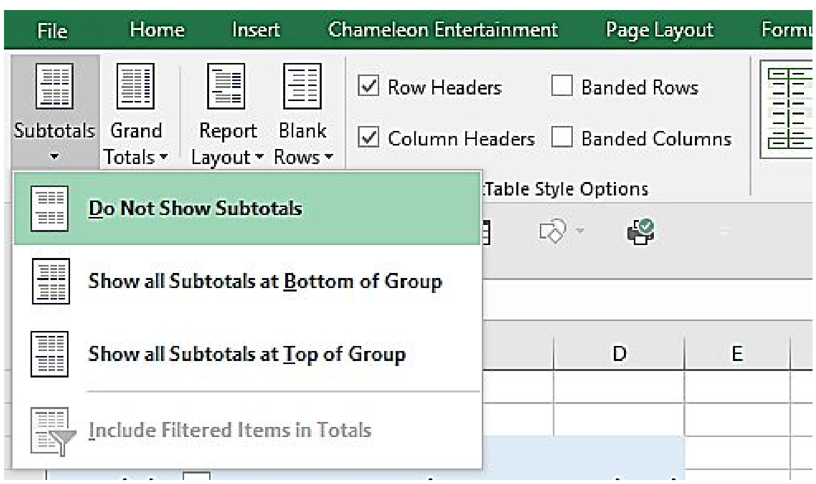
Follow the steps below to do so;

1. Simply right-click on any item in the pivot field (probably the one you want to change).
2. Select Field Settings and on the next box that appears, move to the Subtotals and Filters Tab and pick Custom.
3. Select one or more summary functions. Do so from the list of functions displayed for you.
4. After that, pick Ok.

Turning off subtotals for a field

To disable Subtotals in a pivot table, follow these steps:

1. Within the pivot table, choose a cell.
2. Inside the ribbon, go to the Design tab.
3. Choose "Do not show subtotals” from the Subtotals drop-down option.



Displaying multiple subtotals for a field

Subtotals for the outer fields show automatically when numerous fields are added to the Row Labels section of a pivot table. Region and City fields are in the Row Labels portion of the pivot table below. The Values section has two fields: Sum of Quantity, which displays the total quantity for each city, and Sum of Total Price, which displays the entire sales amount.

3		Values	
4	Row Labels	Sum of TotalPrice	Sum of Quantity
5	⊟East		
6	Boston	$126,630.33	56,516
7	New York	$113,782.84	53,938
8	Philadelphia	$103,932.60	49,160
9	**East Total**	**$344,345.77**	**159,614**
10	⊟West		
11	Los Angeles	$85,268.44	40,712
12	San Diego	$39,573.67	18,414
13	**West Total**	**$124,842.11**	**59,126**
14	**Grand Total**	**$469,187.88**	**218,740**

1. Simply right-click and select Field Settings. Pick the Subtotals and Filters Tab.
2. Choose Custom and choose the functions for the subtotals. Click Ok.
3. You will see the subtotals beneath the group. This is done whenever you pick multiple Custom subtotals. It will not change even when you decide to let it show at the top of the group.

Introducing Custom Calculations

A custom calculation is a formula you create to generate PivotTable values that would not show in the report if you simply utilized the source data fields and Excel's built-in summary calculations. Custom calculations allow you to expand your data analysis to include outcomes that are tailored to your individual requirements. You can also call it a Calculated Field.

Calculated Fields are most often used to add a new Field to your Pivot Table. The newly introduced Field performs computations depending on the values of other fields, in most cases.

Calculated Fields, in more specific terms, employ the sum of the original data of the Field(s) that the Calculated Field calculation uses. Furthermore, when you interact with Calculated Fields, you're dealing with all of the relevant Field's underlying data (rather than individual Item(s). Calculated Fields are handy when you wish to utilize all of the data from a specific Field(s) in your computations for the reasons stated above.

Assuming you need to calculate the Cost of Goods Sold for every retailer and item using a simple technique. The computation is quite basic to make the instances as easy as possible and to concentrate on the concept of Calculated Fields. For each item and shop, we'll believe you can compute the Cost of Goods Sold as a percentage of the Sales Amount. Arithmetically:

COGS = Total Sales multiplied by a percentage

It's worth noting that the Pivot Table's source data lacks a column for Cost of Goods Sold.

In certain cases, you may be able to add such a column by going back to the source data. In other circumstances, however, making a new column to the data sources may not be feasible or practical. Using a Calculated Field instead of adding a new column to the source data is an option.

This isn't to say that Calculated Fields aren't useful in certain situations. I'll go through a few typical Calculated Fields issues and restrictions further down. That overview should aid you in identifying situations when Calculated Fields are not the best option.

Checking out the custom calculation types

There are two types of custom calculation. They are Calculated fields and Calculated Items. Calculated Fields are most often used to add a new Field to your Pivot Table. The newly introduced Field performs computations depending on the values of other fields, in most cases.

Calculated Fields, in more specific terms, employ the sum of the original data of the Field(s) that the Calculated Field calculation uses. Calculated Fields are not to be confused with Calculated Items. These names pertain to separate constructions, despite the fact that they have certain characteristics.

Calculated Items vary from other types of items in that they function with individual data. Calculated Items, in other words, enable you to operate with Item(s) from inside a Field.

As previously stated, Calculated Fields employ all of the original data of the Field(s) that the Calculated Field formula uses.

To put it another way, you typically do the following:

1. When you wish to deal with all of a Field's underlying data, use Calculated Fields (s).
2. As previously said, adding a column to your source data is an approximate approximation of Calculated Fields.
3. If you want to interact with particular Item(s) inside a Field, use Calculated Items.

Calculated Items are essentially comparable to increasing row(s) to your source data, just as Calculated Fields are approximately comparable to extra columns in the source data.

Inserting a custom calculation field

You're probably aware that Excel is a calculating engine, as well as the ability to construct a calculated field, is a feature you'll want in your toolbox when dealing with pivot tables.

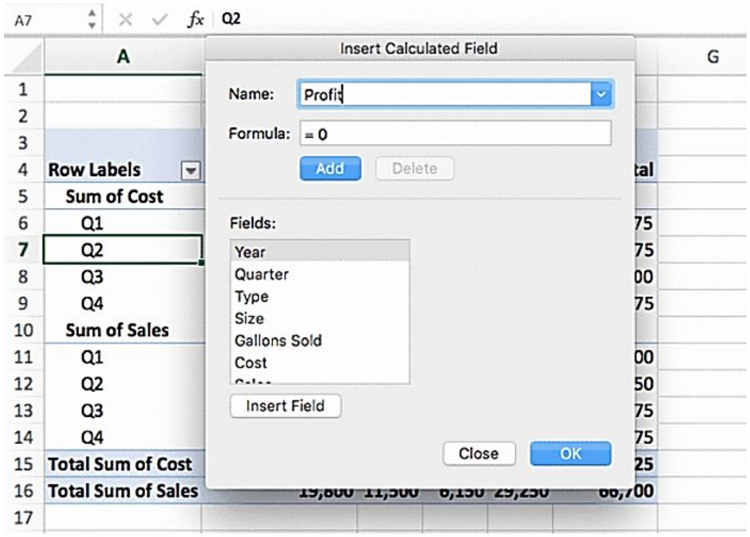
A calculated field lets you maintain a computation operating across a pivot table, just as you would with a formula in a worksheet.

Ryan desires to know how much money he makes on each style of beer he sells: Pilsners, Stouts, Ambers, and IPAs. It's a pain to make the income computation outside the pivot table since he has to remove the Q1 expense from the Q1 revenues and do the exact thing for Q2, and so forth.

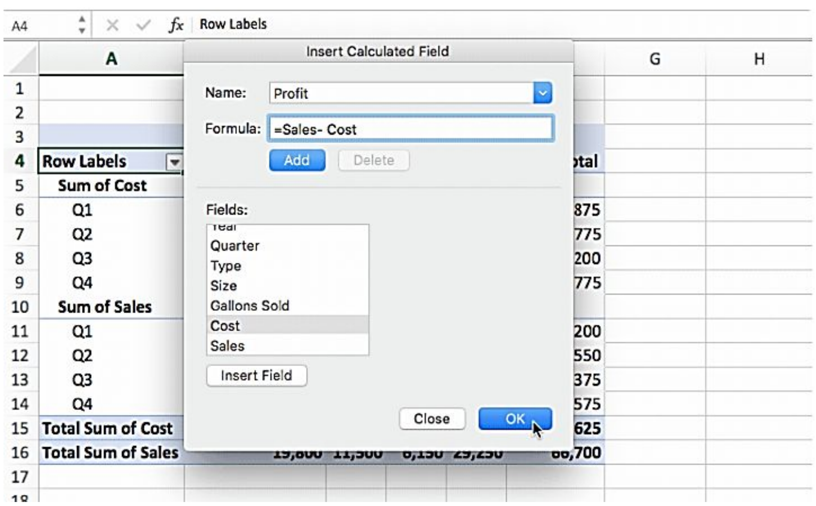
He can create a calculated field that will calculate the figures for him and tell him how much money he'll make on each sort of beer.

And here is how you do it:

1. While within a pivot table cell, move to the "Pivot Table Analyze" tab, choose the "Fields, Items, and Sets" button, and then pick "Calculated Field."
2. Then, Ryan has to enter the name of the field.



3. Ryan must now input the formula he is attempting to compute. To calculate profit, he understands he must deduct his costs from his sales.



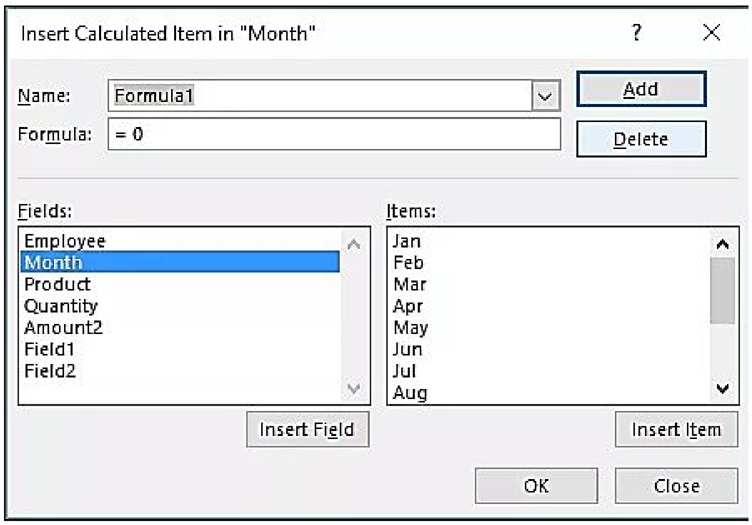
4. So he'd go to "sales" and press "Insert Field," enter in the negative sign, and then go to "Cost" and press "Insert Field."

5. Ryan can readily view his income for each kind of beer—as well as his overall profit—on the lower part row of his pivot table now that the computed field is in position.

Inserting a custom calculation item

Calculated items are similar to all other things in your pivot table, except that they don't appear in your data sources. They are simply made following a formula. According to your needs, you may update, alter, or remove computed Items.

1. Simply choose the Pivot Table.
2. Click on Analyze on the ribbon. Pick Fields, Items, and Sets. Then, choose Calculated Item.
3. Enter the formula and the name. then, choose the fields and the items and click Ok.



Editing a custom calculation

1. Simply navigate to the Insert Calculated Field box. To do this, simply click on any cell in the Pivot Table and select Analyze Tab. Pick Fields, Items, and Sets. Then, you pick Calculated Field.
2. Choose the field that you want to modify. You can modify the formula and name.

Deleting a custom calculation

Simply click the Delete button on the Insert Calculated Field box after selecting the field you want to remove.

Conclusion

We have gone through the different ways you can perform the Pivot Table calculations. There are lots of calculations you can do and you have mastered how to do them with the steps you have gone through here. So, use them to work more on Pivot Table calculations.

CHAPTER EIGHT

BUILDING PIVOT CHARTS

Introducing the Pivot Chart

Have you ever had the opportunity to reflect on an excel sheet that is so jam-packed with information that you can't tend to construct the meaning of it all? That merely combing through the data makes you feel like your head is about to burst when you look at it? If that's the case, you're not alone.

For companies today, data does everything. From inventories to client purchasing patterns, we've got you covered. Having data is similar to being given a plan for achieving a sustainable competitive advantage. Raw data, on the other hand, won't assist you nearly as much. What you want and need to do now is examine the data for patterns and use what you've learned to make better judgments in the future.

This is where things become complicated; data analysis is a time-consuming operation that needs the assistance of a professional. But it doesn't have to be that way all of the time. You can always rely on technology to assist you with this.

Pivot charts are a great way to get that support.

Whenever data is raw and unstructured, it may be incredibly hard for an individual to summarize and comprehend the information completely. This is not only exhausting and mentally taxing, but it's also uncomfortable and tough to picture. Pivot Tables and Pivot Charts come to the rescue in these situations, allowing you to summarize, display, and analyze data in a structured and organized style that is both simple to understand and well-presented. In a word, Pivot Charts are a fantastic method to view data quickly and effectively. A Pivot Chart is a graphical depiction of a Pivot Table that is also a built-in feature of MS Excel.

Whenever working with large volumes of data, a pivot chart is very handy. For example, a company with a big number of workers may use Excel to track each student's operating time, so that at the end of each month, the employee with the most working hours would be given a bonus for their dedication and sincerity to the company. Whilst working with the whole list of people would be time-consuming and perhaps inaccurate, a pivot table, or, for that matter, a pivot chart, would allow for speedy reorganization and visualization of data in a comprehensible way, easing the full procedure.

Understanding Pivot Chart pros and cons

There are advantages and disadvantages of the Pivot Chart/Pivot Table and they are listed below.

Advantages are:

Pivot tables show you how your data works — Pivot tables are one of several tools available to assist individuals to have a better understanding of their data. From one set of data, you may produce various reports on multiple data sets.

Works nicely with SQL exports - SQL queries create a lot of the data we have in our company. SQL exports (data downloaded/exported from SQL databases) and SQL servers are both supported by pivot tables. This makes data collection and transmission into a format that can be readily analyzed much simpler.

Large volumes of data may be separated - One issue with data analysis is that it becomes more difficult as the quantity of data grows. You can simply separate data using pivot tables, regardless of how large the entire data collection is. This enables data analysis to be simpler and might even help you detect patterns.

It's useful to generate immediate data - Once data is put into a pivot table, you may utilize it however you want. You may also utilize formulae to produce quick data or put formulas right into the pivot table.

Disadvantages are:

Pivot tables demand enough time to learn – While generating a pivot table in Excel just takes a few clicks, fully understanding the tool takes effort. Pivot tables may be difficult and daunting for first-time users. Only once you've "tamed the beast" will you be able to utilize it correctly for data analysis.

It might take a long time to learn how to utilize it – Based on how you want to utilize your data in the pivot table, it may require some time to do so. This is due to the fact that the tool itself lacks a comprehensive set of computation choices. This implies the user will have to manually compute the data or enter equations, which will take time.

There are no updates that happen automatically – You're effectively depending on outdated data for your metrics and analytics unless you routinely update your pivot table with fresh data. This implies that using pivot tables for real-time analytics will be difficult.

Desktop computers (old ones) may not be capable of handling big data sets; Nevertheless, when dealing with a few thousand pieces of data, any computer will suffice. However, as you reach the tens of thousands, aging machines may fail to afford the data you want. It's also fairly uncommon for computers to fail simply because the quantity of data they're processing is too much for them to manage.

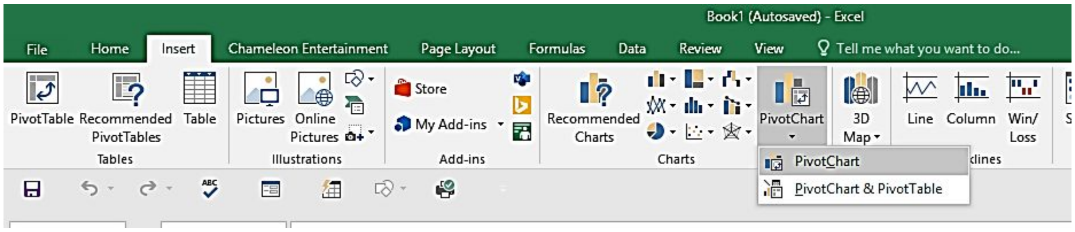
Understanding Pivot Chart Limitations

You can't use Pivot Charts to produce reports using Multi-select / Checkbox field types. When you add a new field to a pivot table that is already existing for which a Pivot Chart has already been produced, Excel adds the new field to the last column automatically. This order cannot be changed, nor can the extra field (column) be placed in the midst of the other columns.

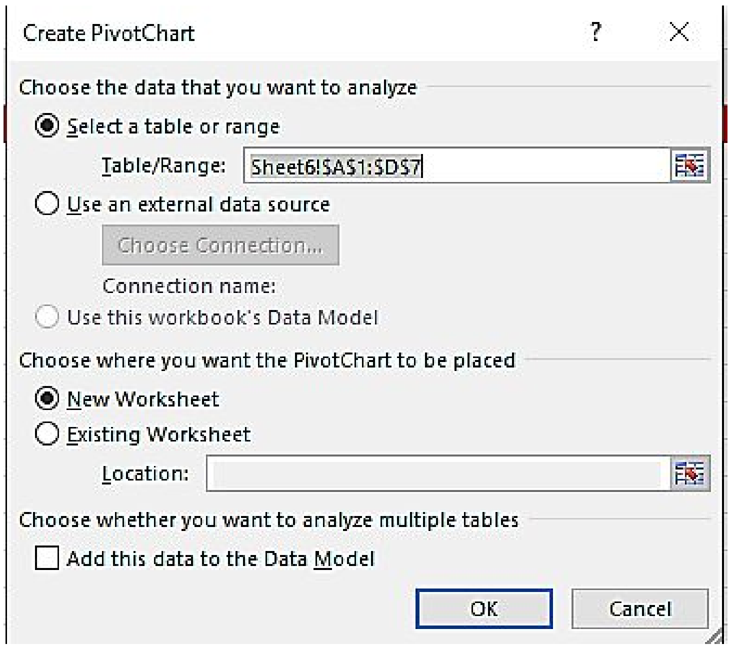
Creating a Pivot Chart

A normal chart makes use of a variety of cells, but a pivot chart is formed based on the data summarized in a pivot table. A pivot chart is essentially a dynamic chart, however, converting a regular chart to a dynamic chart requires data adjustments.

To create the chart, simply choose the cells in your worksheet. Navigate to the Insert tab, then pick Chart before choosing Pivot Charts.



A menu will appear which will contain the cells you have selected. Choose where you want the chart to be placed. You can Use an External Source if you want to create the Pivot Chart from another source.



Pick Ok.

Pivot Chart has four elements just like a pivot table which are Axis, Legend, Values, Report Filter.

Creating a Pivot Chart from a Pivot Table

After opening the Excel worksheet, look for the file that contains the pivot table and the data source from which you want to create the pivot chart.

Choose the way the pivot chart will be and what it is to represent. Such as the columns, style, the chart type, and so on.

Then, click the Insert Tab and select Pivot Chart.

Choose the chart type and press Ok.

Working with Pivot Chart

Moving a Pivot Chart to another sheet

You may want to rearrange your dashboard or modify it. but before you achieve this, you will like to move your Pivot Chart to another sheet in the same workbook or another one. People do work on a Pivot Chart in another sheet before they move it into the main worksheet.

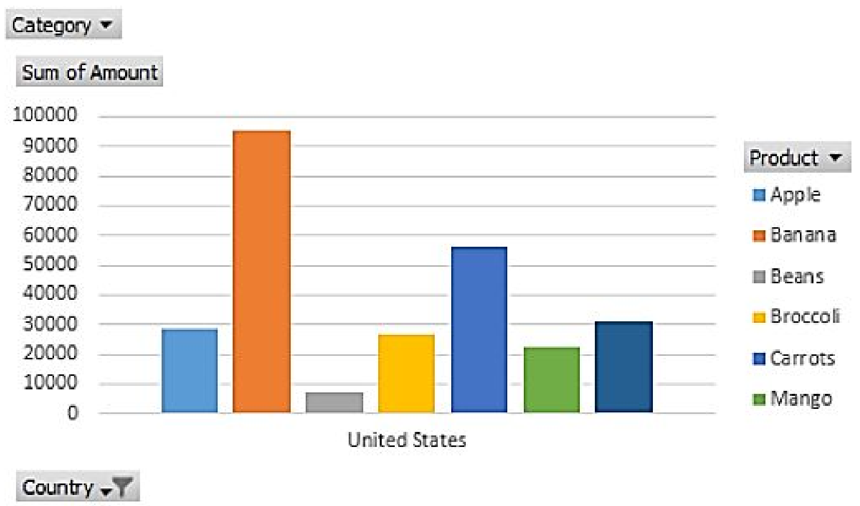
Follow the steps below to do so;

- Select the pivot chart. Then, move to the Options tab and navigate to the Action section.
- Then, choose Move Pivot Chart. The dialog box of the Move Pivot Chart will show.
- Select where you want to move the pivot chart. You can select a new worksheet or within the current worksheet.
- Click Ok after choosing an option.

Filtering a Pivot Chart

Filtering a Pivot Chart is the practice of developing it easier to create a Pivot Chart dependent on a set of criteria. A customized Pivot Chart may be generated, for instance, if a Pivot Chart is generated that shows the sales of various things or commodities in different nations depending on a given condition or, conversely, a filter. This is used for data display and analysis. Simply follow the steps to do so.

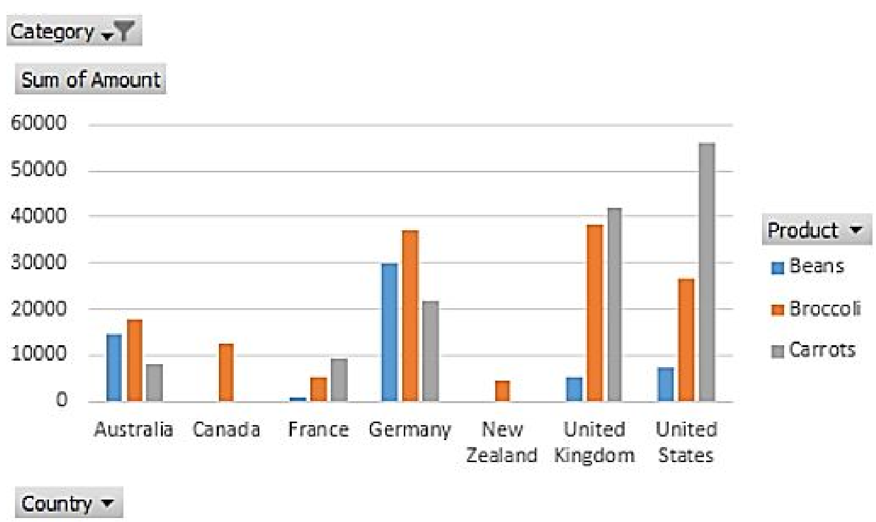
So, I will utilize the standard filters which is the triangle next to the Product and Country. So, I will use the Country filter to display the overall amount of each product that is exported to the United States.



Remove the Country Filter

Due to the fact that we included the Category filter in the Filters area. So, we will filter the chart by category.

So utilize the Category filter to only display the vegetables exported to each country.

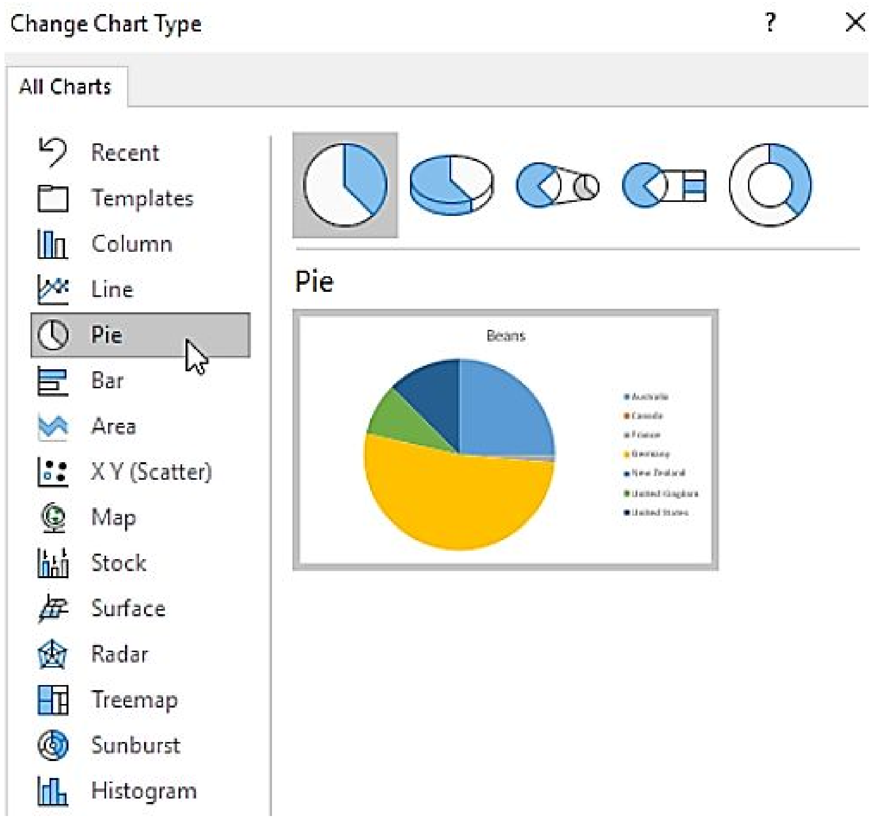


Changing the Pivot Chart type

Choose the Chart that you want to modify its type.

Go to the Type group on the Design Tab and select Change Chart Type

Then, select the chart you want.



Then, select Ok.

Adding data labels to your Pivot Chart

- Right-click on the data series in the chart. then, choose **Add Data Labels**.
- Hit any of the data labels to choose all data labels. Then, choose the specific data label for the chart.
- You can repeat these steps to add more data labels.

Sorting the Pivot Chart

Sorting makes it easier for you to understand your data. It is very helpful when you have lots of data in your pivot table or chart. There are different ways you can sort your data in the pivot chart. You can sort your data from the highest values to the lowest, alphabetically, and so on.

- Click the Pivot Table and select the small arrow next to the heading of your column
- Then, choose the sort option that you want.

Adding Pivot Chart Titles

Adding titles to your chart helps you to understand the chart and what it is meant for. Simply click on the chart and choose the Chart Title box. Click on the plus (+) sign at the right-hand side of the chart. Click the arrow beside the Chart Title. Choose Centered Overlay. This is to make the title be over the chart. To remove the title, simply uncheck the checkbox of the Chart Title.

Displaying a data table with Pivot Chart.

- Select anywhere on the chart. navigate to the Chart Tools section in the ribbon and select Labels.
- Choose Data Table. You will have a list of options. Choose a Data Table and select Show Data Table.
- Then, choose Ok.

Conclusion

Pivot Charts are very useful in Excel when organizing your data. This chapter has explained the ways you can work with it somas to have a good structure of your data.

CHAPTER NINE

UNDERSTANDING EXCEL DATA MODELS

In Excel, a data model is a sort of data table wherein two or more tables are linked by a common or many data series. In a data model, tables and data from several other sheets or sources come together to produce a single table that can acquire files from all the tables.

Elaboration

By constructing connections based on a common column, it is possible to integrate data from various tables.

Data models are applied openly, resulting in tabular data that can be utilized in Excel Pivot Tables and Pivot Charts. It combines the tables, allowing for in-depth analysis in Excel utilizing Pivot Tables, Power Pivot, and Power View.

The data model enables data to be loaded into Excel's storage.

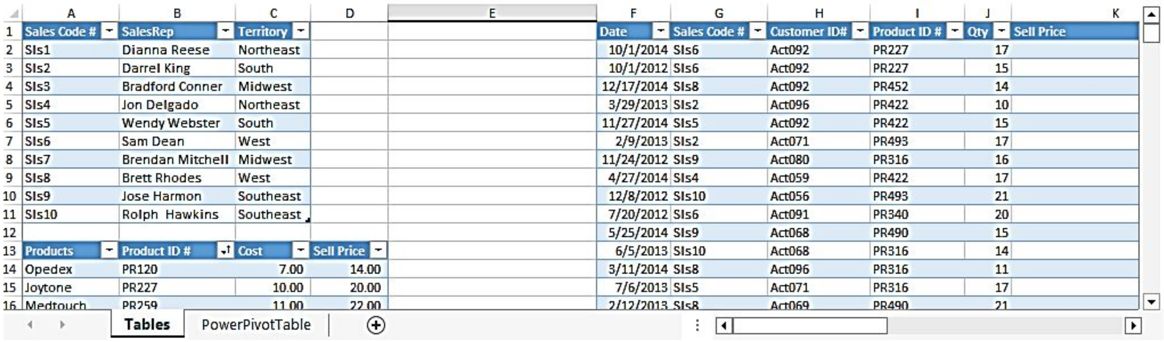
It's preserved in memory, where we can't view it immediately. Then you may tell Excel to use a common column to link the data together. The Data Model's 'Model' section describes how all tables relate to one another.

Even if the information is spread across different tables, the Data Model can access it all. Excel has the data in its memory once the Data Model is built. The data in its memory may be accessed in a variety of ways.

Dealing with Data Models

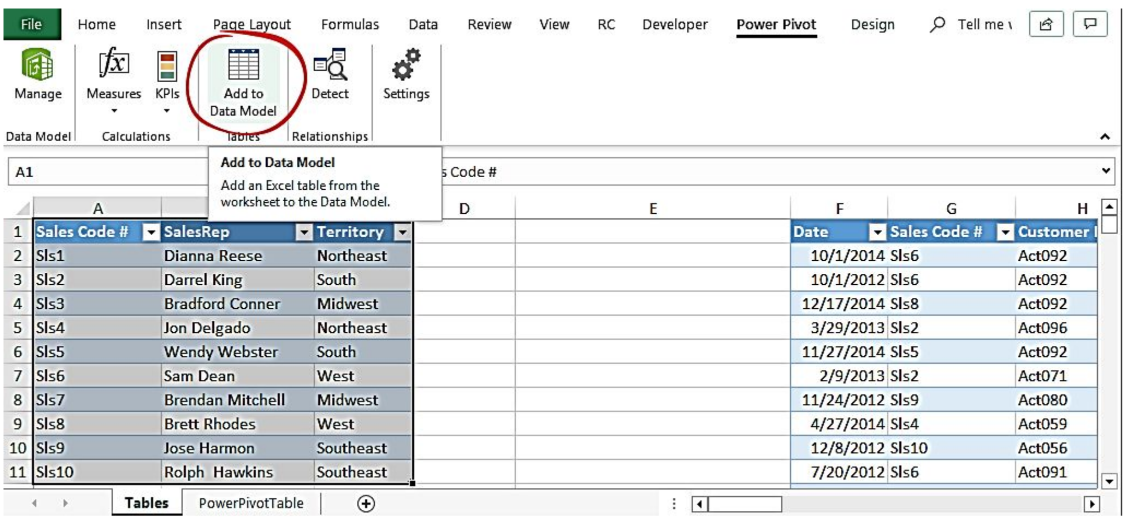
We'll teach you how to create a tiny data model using tables and PowerPivot in this segment. You may also obtain an insight into the Quick Explore tool with only a few taps. If you want to delve down into the specifics in Excel, Quick Explore is the way to go. It's important to note that this feature requires Excel 2013 or later.

On the Tables worksheet, we have sales-related datasets.

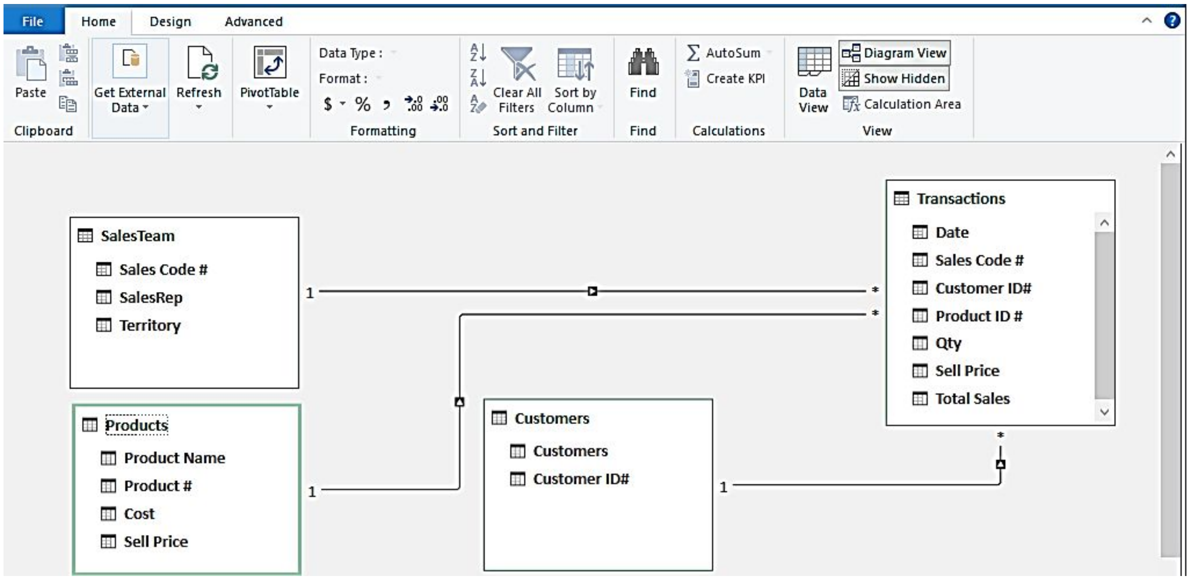


Let's start by establishing table connections.

Insert the specified table first from the Worksheet to the Data Model after selecting the range.

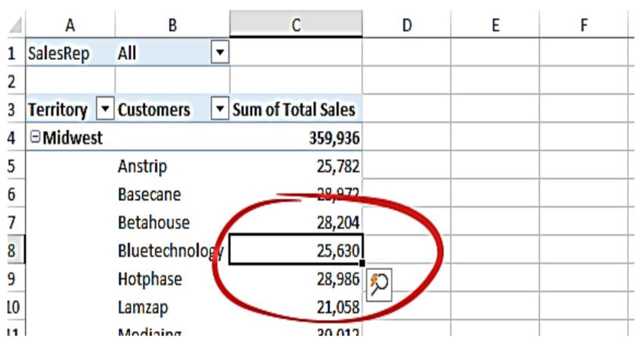


In PowerPivot, choose the Manage option. That's a sandstone Excel add-in for data analysis. We'll construct a Data Model that includes the following connections between the sales tables:



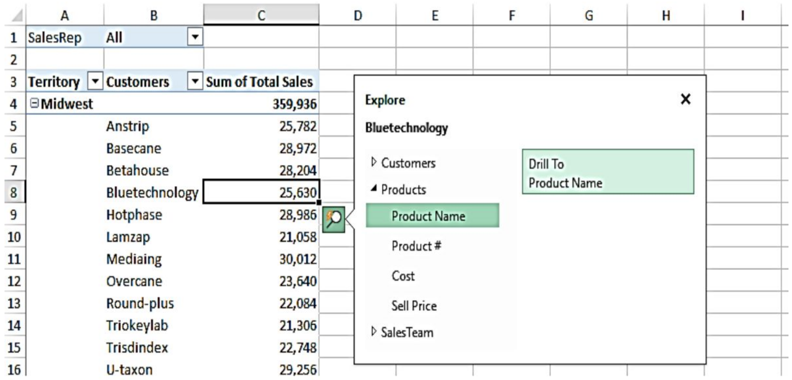
Build a pivot table using the data from the source tables. Select the PivotTable symbol in the PowerPivot pane. A new Worksheet will be created to describe and organize the design.

Select a data-filled cell on the new worksheet! The symbol for Quick Explore now shows.



	A	B	C
1	SalesRep	All	
2			
3	Territory	Customers	Sum of Total Sales
4	Midwest		359,936
5		Anstrip	25,782
6		Basecane	28,972
7		Betahouse	28,204
8		Bluetechnology	25,630
9		Hotphase	28,986
10		Lamzap	21,058

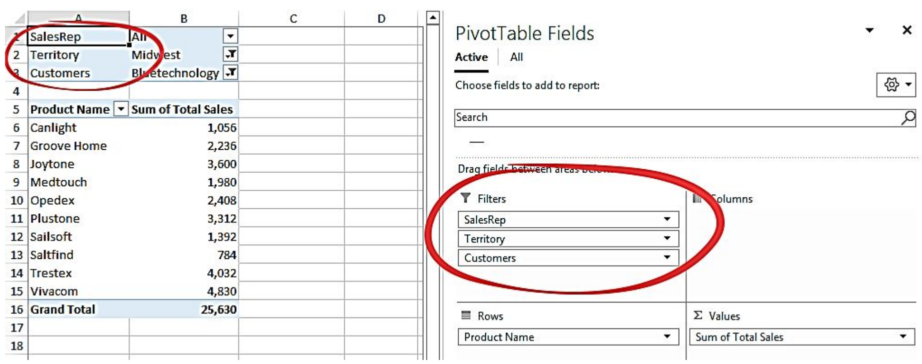
Select the icon. The Explore area will appear on the screen. The Pivot Table's tables are shown in the pop-up pane. You may drill down deep using any of the available choices.



Select the symbol for Quick Exploration. A pop-up panel called Explore emerges. This panel displays all of our Pivot Table sales tables.

To drill down deeper into the information, choose one of the available fields. We wish to select the required product names from cell C8 in this case.

Customers of BlueTechnology in the Midwest will get a value of $25630. On the Explorer window, select this option.



Excel will construct and alter the Pivot table. Check out the filters in the top-left area. The pivot table has been reorganized to display information about the chosen cell.

Is it necessary to reorganize the layout? To restore your default table structure, use Control key + Z on your keyboard.

It is beneficial for anyone to look beyond the exterior. In circumstances when we need to dig down to the base of the data sets and inspect the specifics, it is achievable. The drill-down approach is our ally in this approach. When dealing with enormous data tables, utilize this function with caution since there's a lot to learn with little investigation.

Creating a relationship between tables

Have you ever tried using VLOOKUP to copy a column from one table to another? VLOOKUP is no longer needed now that Excel includes a built-in Data Model. Depending on matching data in each table, you may construct a connection between two tables of data. Then, even if the tables are from separate sources, you may generate Power View sheets and construct PivotTables as well as other reports using fields from each table. If you have client sales data, for instance, you could wish to import and link temporal intelligence data to examine sales trends by year and month.

Excel may frequently construct such associations in the Data Model it's developing behind the scenes whenever you import related tables from a relational database. In all other circumstances, you'll have to manually construct connections.

- Make that there are at least two tables in the workbook and that each table includes a column that can be mapped to another table's column.
- **Choose one of the following options:** Make a table out of the information, or make a graph out of it. In a new spreadsheet, import external data as a table.
- **Assign a relevant name to each table:** Select Design. Pick Table Name and then input a name in Table Tools.
- Check that the data values in a column in one of the tables are unique and there are no duplicates. Only if one column has unique values can Excel build the connection.
- Select Data and then, choose Relationships.

Your worksheet will consist of just a table if the relationship is grayed out.

- Move to the **Manage Relationship** box and select **New**.
- Select the arrow for Table in the **Create a Relationship** box. Choose a table.
- Choose the column that consists of the data which is related to the **Related Column** (**Primary**) for the **Column (Foreign**).

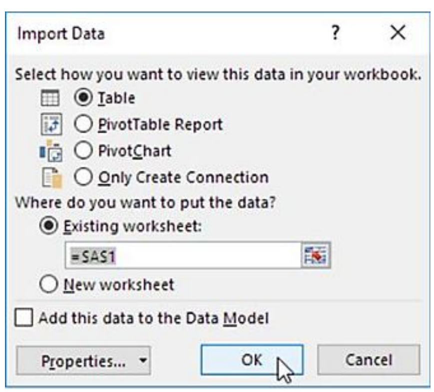
- Choose a table that consists of at least one column of data that is related to the table you have chosen for Table for the **Related Table**
- Pick a column that consists of unique values which match the values in the column you have chosen for Column for **Related Column (Primary)**
- Choose Ok.

Importing related external data tables

There are different ways you can get data in Excel. You can get external data from Access, Web, Text, and Other Sources. Here, I will show you how you can import data from all of them.

Import Access Data

- Move to the Data Tab and navigate to the Get External Data Group. Then, Select From Access.
- Choose the Access File
- Select Open.
- Pick a Table and pick Ok.
- Choose how you want the data to be viewed and where you want to place it. choose Ok.



- You will get the result on your worksheet. You can refresh it anytime you want to.

Import Web Data

- Move to the Data Tab and navigate to the Get External Data Group. Then, Select From the Web.
- A dialog box will open and it will show you the homepage of your browser with the URL of the page being highlighted.
- Paste the web address. Search for the data table and click on it. Then, select Import.

Import Text Data

- Move to the Data Tab and navigate to the Get External Data Group. Then, Select From Text.
- Choose the file you want to import
- Select Import.

Import Data from Other Sources

- Move to the Data Tab and navigate to the Get External Data Group. Then, Select From Other Sources.
- Select the source you want to import from the list of sources displayed for you. Here, I go with SQL Server
- Put in the name of the server and the log-on credentials in the Data Connection Wizard.
- Then, select Next.
- Pick the database and the tables that you will want to work with. Choose Next.
- Then, click Finish.

Basing a Pivot Table on multiple related tables

- Select the Insert tab and choose the Pivot table button.
- Choose the first table you want to add.
- Click on the box next to the Add this data to the Data Model option. Select Ok.

- In the Pivot Table window, select All. This is to show all the tables. Select the boxes of the tables that you want to include in the Pivot Table.

Managing a Data Model with Power Pivot

You may develop a Data Model, which is a grouping of tables with connections, in both Excel and Power Pivot. The data model in an Excel worksheet is the same as the data model in the Power Pivot interface. Every dataset you upload into Excel is also accessible in Power Pivot.

Power Pivot is a SQL Server Analysis Services engine that is made accessible via an in-memory procedure that operates inside Excel. Internal Data Model is the term used to describe it. The Power Pivot Ribbon interface is the most efficient method to deal with the Internal Data Model.

You may construct a Data Model, which is a group of tables with relationships after the Power Pivot add-in is installed and accessible. Any data you bring into Excel or already have in Excel becomes accessible in the Power Pivot window after it has been added to the data model. Over and beyond the conventional Excel Data tab, the Power Pivot Ribbon provides extra functionality.

Now let us take a glance at how Power Pivot fits into the entire Business Intelligence workflow and how it interacts with the other BI tools in Excel to get a sense of where it fits in when utilizing Excel for analysis of data or presentation.

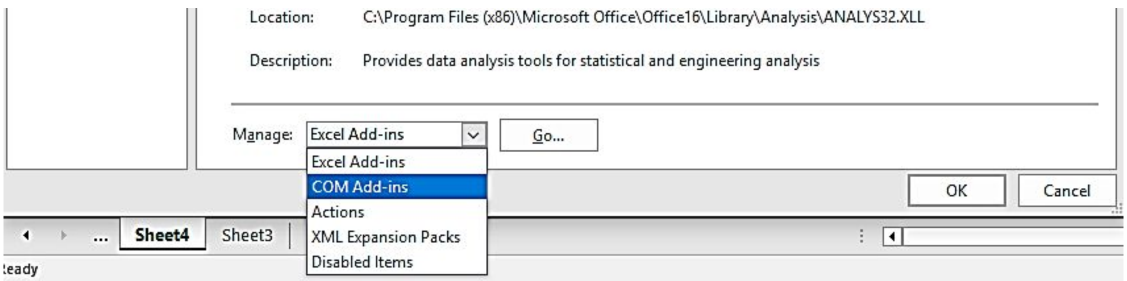
Because Power Pivot is a data model, the first step is to import some data. You'll need a tool or connector to connect to various sorts of data sources and get your data unless it's already in your Excel sheet. Depending on your data source, this may be a complicated issue that is beyond the scope of this essay.

After you've got the data, you'll have to clean it up and modify it. Another Excel add-in called Power Query does both of these capabilities. The Power Pivot data model is created as the last stage. This is where we make the connections between the various data tables.

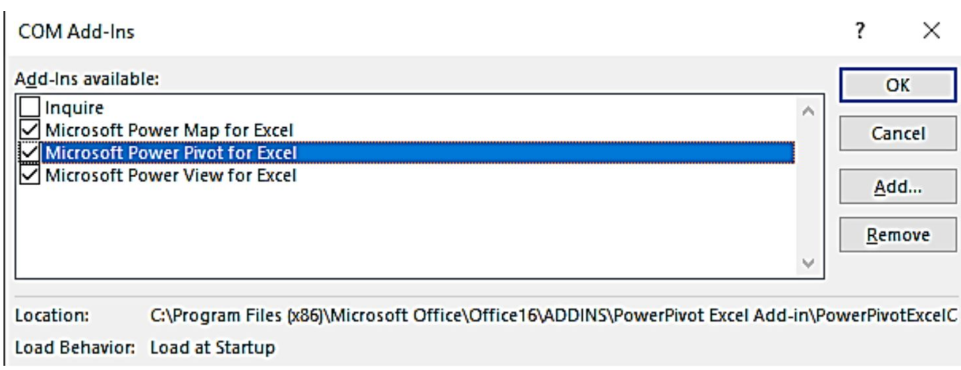
Lastly, once you've calculated all of the required metrics, you can use Pivot Tables and/or Pivot Charts to summarize the data in your Power Pivot data model. A dashboard can be created by combining multiple Pivot Tables / Pivot Charts with slicers.

Enabling the Power Pivot Add-in

1. To activate Power Pivot in Excel, access the backstage view by clicking the "**File**" button inside the Ribbon.
2. Secondly, on the bottom left of the backstage view, choose the "**Options**" section to access the "**Excel Options**" box.
3. Choose the "**Add-Ins**" option on the left flank of this window.
4. Pick "**COM Add-ins**" out from the "Manage" drop-down just at the bottom right-hand side of this window.



5. Next, to access the "COM Add-Ins" panel, select the adjoining "Go..." button.
6. Tick the box on the "Microsoft Power Pivot for Excel" add-in in this window.



7. Now, on the right, press the "OK" button to activate the add-in.

Adding a table to the Data Model

In Excel, a PivotTable may only be created from a single table or range. You may use the Data Model to add new tables to the PivotTable if necessary.

Assume your workbook has two worksheets.

- The first is a table that contains the data of salespeople and the territories they represent.
- The second contains sales data by area and month

Salesperson	Region
Albertson, Kathy	East
Brennan, Michael	West
Davis, William	South
Thompson, Shannon	North

Region	Month	Order Amount
East	January	$925.00
East	February	$875.00
East	February	$500.00
East	March	$350.00
West	January	$400.00
West	January	$850.00
West	January	$1,500.00
West	February	$550.00
West	March	$400.00
South	February	$235.00
South	January	$850.00
South	March	$600.00
South	January	$250.00
North	January	$875.00
North	January	$265.00
North	February	$375.00
North	February	$1,345.00
North	March	$300.00

The sales may be summarized per salesperson as shown below.

- Sales may be accessed by clicking the table.
- Choose the INSERT tab.
- Inside the Tables category, choose PivotTable.

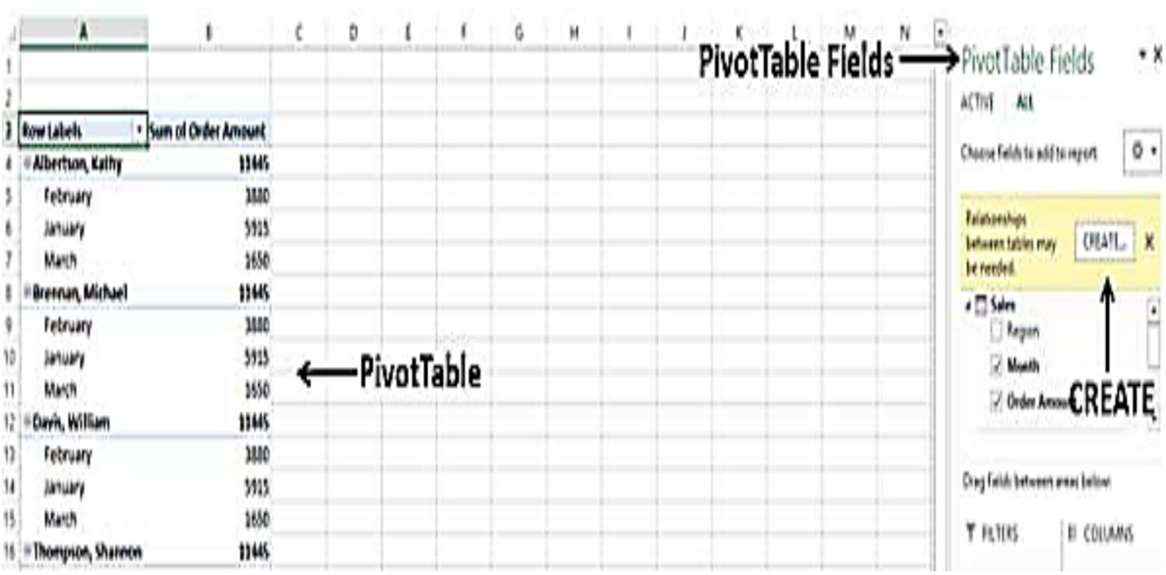
  A blank PivotTable will be constructed using the variables from the Sales data – Region, Month, and Order Amount. Underneath the PivotTable Fields list is a MORE TABLES command.

Selecting more tables.

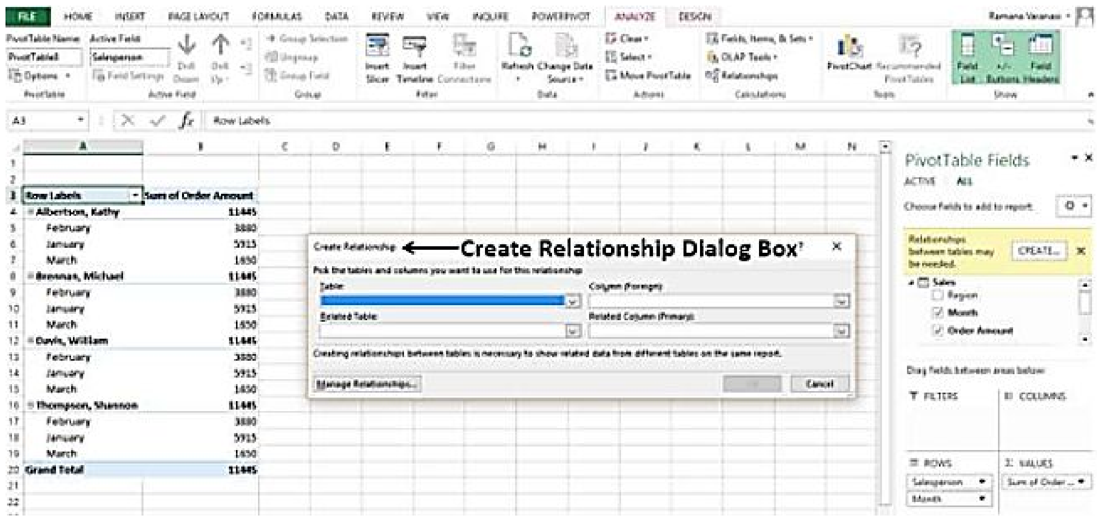
The dialog box Create a New PivotTable opens. To leverage several tables in your analysis, a new PivotTable must be built using the Data Model, according to the information provided. Select Yes. A new Pivot Table will be created.

You'll see that there are two tabs under PivotTable Fields: ACTIVE and ALL.

- Click the ALL tab.
- In the PivotTable Fields list, there are two tables: Sales and Salesperson, each with its own set of fields.
- Drag the Salesperson field from the Salesperson table to the ROWS area.
- Drag the Month field from the Sales table to the ROWS area.
- Drag the Order Amount field from the Sales table to the VALUES box.



The PivotTable is now ready to use. A notification occurs in the PivotTable Fields stating that table relationships may be required. Besides the message, select the CREATE button. The dialog box for creating a relationship displays.



- Choose Sales from the Table drop-down menu.
- Choose Region from the Column (Foreign) box.
- Choose Salesperson from the Related Table drop-down menu.
- Choose Region from the Related Column (Primary) box.
- Choose the OK button.

The PivotTable has been created from two tables on separate spreadsheets.

Creating a relationship between tables with Power Pivot

Dealing with several tables adds intrigue and relevance to the data in the PivotTables and reports that utilize it. When you're utilizing the Power Pivot add-in to deal with your data, you can utilize Diagram View to establish and manage relationships between the tables you loaded.

In order to create table connections, each table must have a column with corresponding values. If you're linking Customers and Orders, for instance, each Order record should include a Customer Code or ID that points to a specific customer.

1. Click Diagram View in the Power Pivot window. The tables are immediately sorted based on their connections, and the Data View worksheet style switches to a visual diagram structure.
2. Build a relationship by right-clicking a table diagram and selecting Create Relationship. The dialog box for creating a relationship appears.
3. A column is preselected if the table comes from a relational database. Pick a column from the database that includes the data which will be utilized to connect the rows in each table when no column is pre-selected.
4. Pick a table with at least 1 column of data that is connected to the table you just chose for Table for Related Lookup Table.
5. Choose the column that holds the data that is associated with the Related Lookup Column from the Column drop-down menu.
6. Select Create from the drop-down menu.

When you've created or imported a table for each topic in your Data Model, you'll have to allow the coming together of related data in Excel whenever you need it again. This is accomplished by guaranteeing that linked tables have similar fields and by creating connections among tables. It allows Excel analysis tools like Pivot Tables to pull data from multiple tables.

NB: Despite the fact that Excel verifies if the data categories in each column correspond, it doesn't validate that the columns comprise corresponding data and will build the connection even though the values do not match. Construct a PivotTable that includes fields from both tables to see if the connection is genuine. If the data seems to be incorrect (for instance, blank cells or a similar value repeated down each row), you'll choose alternative fields and maybe different tables.

Creating a Pivot Table or Pivot Chart from your Data Model

The data model is a method of organizing tables and calculations for usage in PivotTables. The data model was once accessible as a Power Pivot add-in and is now included with Excel 2016+ for Windows. Excel 2016 for Windows is used to provide the rest of this article.

There are various benefits to creating a Pivot Table from the data model instead of a single Excel table.

To get us started, here are a few examples.

1. We can create a PivotTable that combines data from different tables.
2. We can build formulae that vastly outnumber those accessible in a standard PivotTable.
3. The formulae are written in a language called DAX, which has a lot of sophisticated features.
4. Using named sets, we may select and pick rows and columns.
5. We can utilize a Get & Transform query (to clean the data before it comes) and link to several data sources (e.g., a CSV file, a database table, and an Excel workbook) in a single model rather than copying/pasting data into a worksheet.
6. We may just Refresh the report in the following times after it has been produced (instead of going through the whole export, clean, import, and merge into a single data table process).

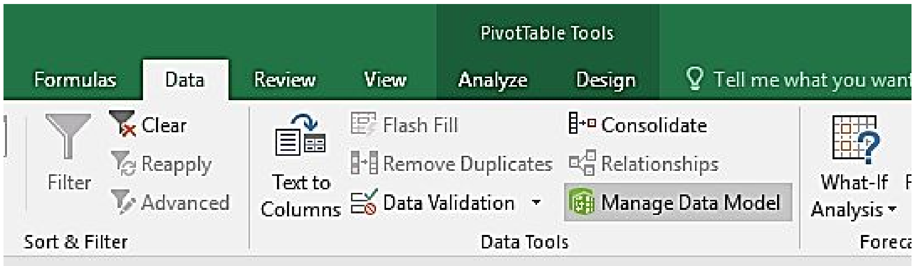
This is only a sampling of the highlights.

So, below are the steps that we are going to follow in doing so.

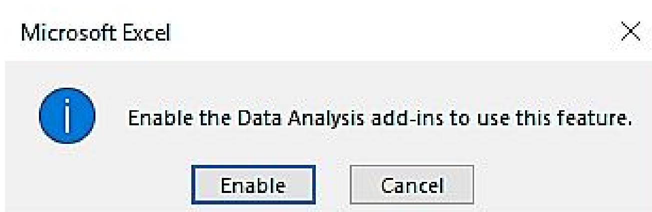
1. Activate the data model.
2. Importing the data model.
3. Define the relationships.
4. Construct the PivotTable

Activating the data model

To enable the data model, simply click the Data tab and select Manage Data Model.



If it is your first time doing this, you will be asked to enable the add-ins.

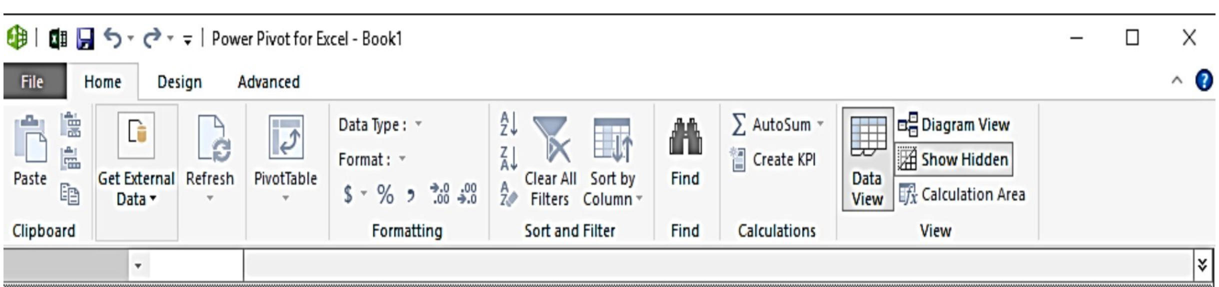


After you have enabled it, you will see the Pivot table tab on the ribbon.

Importing the data models

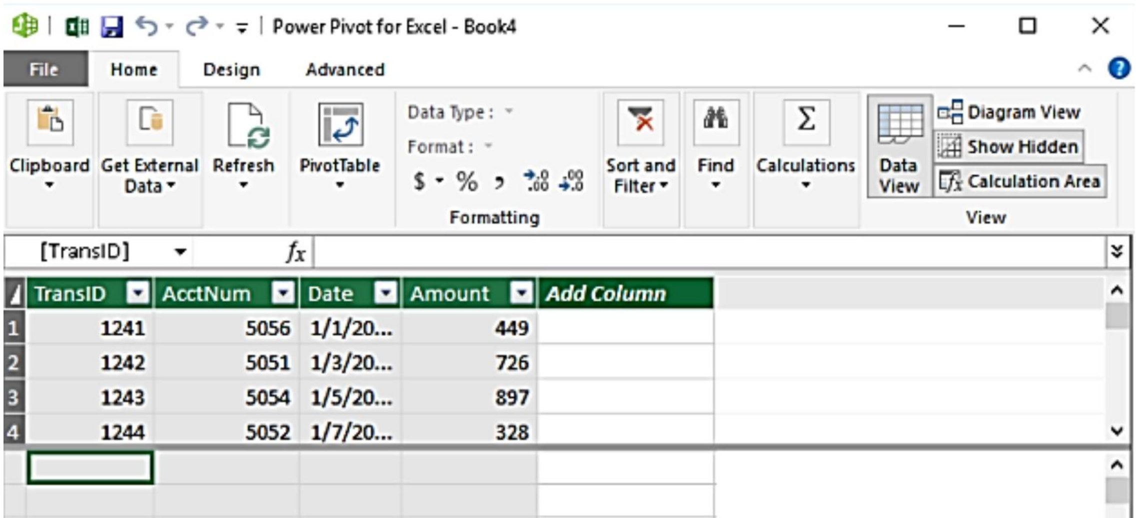
The data tables are then imported. We have certain transactions in a Data Table workbook in our situation. The bank account is included in the transactions, but not the user id. Thankfully, we have a chart of accounts, that is kept in the Lookup Table worksheet.

The procedure for importing data tables varies based on the location of your source data. Click the Power Pivot, then select the Manage ribbon command to get started. The Power Pivot window will appear, as illustrated below.



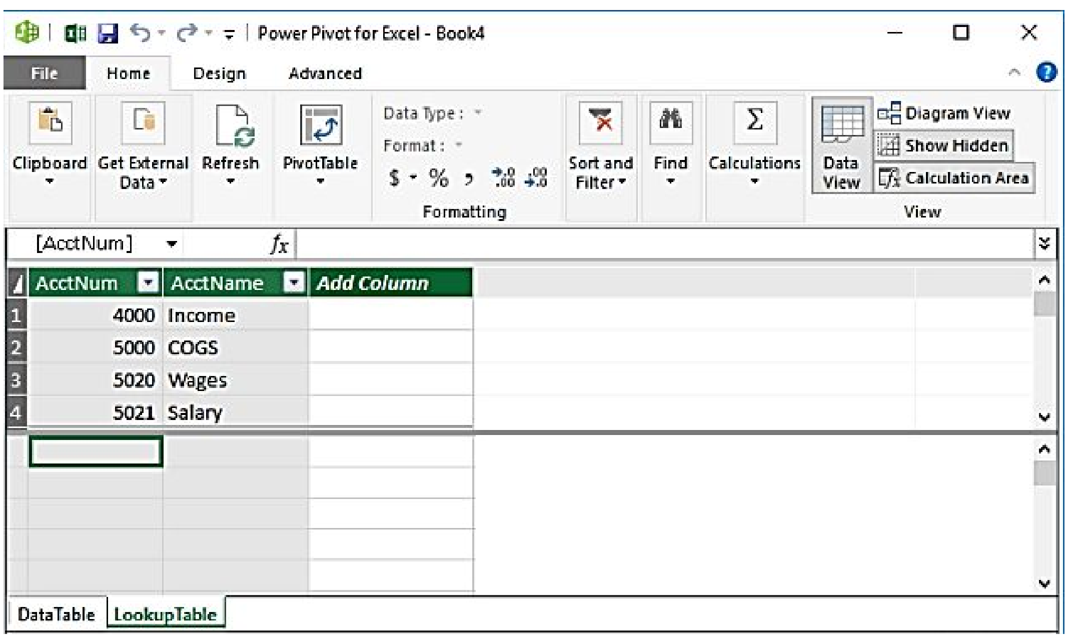
To access the underlying data source, run the Get External Data command.

Because the data is stored in a few Excel files in our situation, we utilize the Get External Data > From Other Sources option and then pick Excel File from the subsequent box. We open the appropriate worksheet and choose the option to use the first row as column headings. After we complete the process, the data is imported into our data model, as seen below.



Note: You should use the Power Pivot > Add to Data Model command if you're constructing a data model within the workbook with the tables.

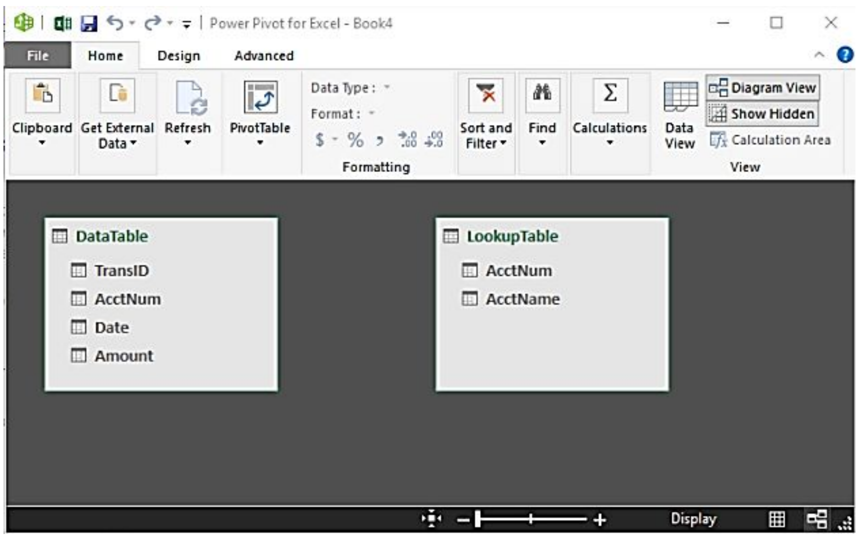
Then we repeat the process using the data from the Lookup Table Excel file. Below is a screenshot of the new Power Pivot window.



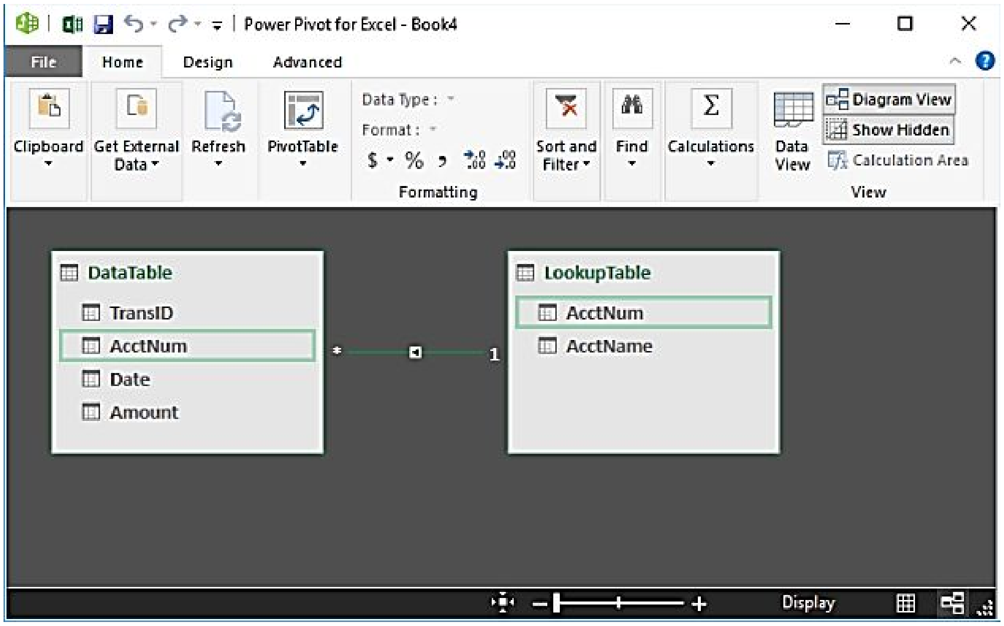
After we've put our data into the data model, we'll need to define the relationships to inform Excel how the tables are connected (which fields are shared between them).

Defining the Relationship

Relationships may be defined in a variety of ways; however, my personal preference is to utilize the visual diagram approach. Just tap the Home > Diagram View command to switch between Data View (shown above) and Diagram View (shown below). Instead of viewing the data transactions, we'll see the tables with the column names, as seen below.



To define the relation, drag the column name from the Data Table to the Lookup Table’s associated column. In this scenario, the AcctNum column of the Data Table is linked to the AcctNum column of the Lookup Table. The relationships are shown in Excel as seen below.

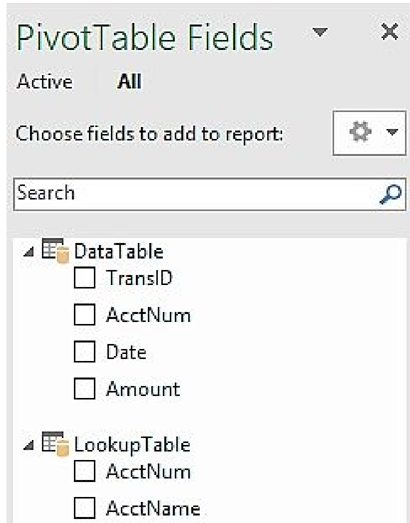


Now, we can create our pivot table.

Construct the Pivot Table

You simply pick a New Worksheet or an Existing Worksheet in the resultant Create PivotTable dialog in the Power Pivot pane by clicking the PivotTable > PivotTable command. When we hit OK, the typical PivotTable field panel appears.

But hold on a second... It seems to be distinct from the usual field panel upon closer study. In most cases, we'll get a list of fields that we may use in the report. But now we can see the tables and expand them to see the fields inside them, as seen below.



Yes, we may choose fields for our report from any or both tables. For instance, we would like the Lookup Table’s AcctName in Rows and the Data Table’s Amount column in Values. And that's it!

Row Labels	Sum of Amount
Computer software	1238
Internet	897
Meals and Entertainment	449
Office supplies	1792
Postage	1292
Salary	217
Small office equipment	1448
Telephone	352
Trade shows	1966
Travel	1175
Wages	1439
Grand Total	**12265**

So, assuming your initial thought is that it would have been simpler to build a single table using VLOOKUP, I completely understand. Well, here is the point: there's a catch. Because there is just one lookup table in this case, it is pretty straightforward. A chart of accounts, a calendar table, a department list, and other lookup tables are supported by the data model. You may also have numerous data tables in your data model, in addition to multiple lookup tables.

There's also the difficulty of always amending our report. We don't need to supervise several lookup formulae each month since we aren't utilizing

VLOOKUP to obtain related data. We may simply Refresh and the new data flows into the report when the external data source is updated, whether for a new account or new transactions. As you may see, this offers up a lot of intriguing options and can help us save time in our workbooks that we use often.

CHAPTER TEN

TRACKING TRENDS AND MAKING FORECASTS

Whenever you're examining data, utilizing Excel's database functions, or, even better, creating a PivotTable or PivotChart, you can do simple calculations like the sum and average, as well as represent the information. Everything is fine. Nevertheless, as important as all these technologies are, they are unable to respond to one very basic question: What really is the general direction of certain past data – it might be earnings, sales, costs, defects, or complaints — given some previous data?

Are profits increasing? Is the number of flaws decreasing? Are sales seasonal (e.g., lower in the cold season, higher in the summer)? Solving these sorts of queries is known as summary statistics because, in this chapter, you'll learn about the sophisticated Excel tools that can help you not only detect the patterns in your data but also anticipate future values. As you'll see, it's all really smooth.

Plotting a Best-Fit Trend Lines

The simplest approach to gain a feel of the general trend represented by a collection of data is to plot a best-fit trend line on a chart. This is a straight line drawn across the data points of the chart, with the discrepancies between the chart points above and below the line canceling each other out.

Regression analysis is a statistical method for studying the connection between two events, one of which is dependent on the other. A best-fit trend line is an example of regression analysis. Housing sales, for example, are influenced by borrowing rates:

- Housing sales increase as interest rates fall.
- When interest rates rise, home sales fall.

Housing sales are referred to as the dependent variable in regression analysis, while interest rates are referred to as the independent variable.

When dealing with historical data, such as sales over time, the independent variable is time, and the dependent variable is the object you're measuring (such as sales).

You must plot your data series as an XY (Scatter) chart to include a best-fit trend line.

Here are the steps to plot a best-fit trend line on an Excel chart if you've previously created one for your data:

- To pick a chart, click on it.
- If your chart includes more than one data series, choose the one you wish to study.
- Select Design and then Add Chart Element.
- Trendline Additional Trendline Options
- The Trendline Format pane displays.
- Select the Trendline Options tab from the drop-down menu.
- Select Linear from the drop-down menu.
- The best-fit trend line is plotted using Excel.
- (Optional) Check the option that says "Display Equation on Chart."
- Steps 6 and 7, which add a little arithmetic to the trend analysis, may be skipped if you simply want to view the trend line. However, if you're interested, do Steps 6 and 7, then read my explanation of what these numbers signify, which follows these steps.
- (Optional) Check the option that says "Display R-Squared Value on Chart."
- Close the window.

Calculating Best-Fit Values

If your study needs precise trend values, you may draw the best-fit trend line and then compute the values using the regression equation. You must, however, recalculate the values if the data values change. Using the

TREND feature is a better option. TREND may handle up to four arguments at once:

TREND(known_ys, known_xs, new_xs, const)

The solely needed parameter is known ys, which is a reference to a range of dependent values or an array of them. The range reference or array of independent values is known xs (the default is the array 1,2, 3,...],n, where n is the number of known ys). Because the new xs option is only used for predicting, it isn't needed here. (I go into more detail about this in the section "Calculating Forecasted Linear Values.") The y-intercept is determined by the const argument: TRUE (the default) calculates the y-intercept based on the known ys, whereas FALSE sets it to 0. (At the point where the trend line crosses the y-axis, the y-intercept is the value of y.)

The following is the technique for calculating best-fit values using the TREND function:

- Choose which cells you want the best-fit values to show in.
- =trend (is a kind of trend.
- To indicate the dependent values, type a reference or an array.
- After that, enter a comma, and then a reference or array to represent the independent values.
- Type two commas and then FALSE if you want to use a trend beginning point of 0.
- (Select).
- Hold Ctrl + Shift and then hit Enter or click the Enter button.
- The best-fit trend values are calculated and entered as an array in Excel.

Plotting Forecasted Values

So far, I've discussed two methods for calculating the R2 value (coefficient of determination), which indicates how strongly the dependent and independent variables are related:

Select the Display R-Squared Value on the Chart check box after plotting the best-fit trend line.

Read the R2 value in the first column of the third row using the LINEST function with the stats parameter set to TRUE.

Give yourself a high-five if you discover that both methods show that the dependent and independent variables are highly linked (that is, the R2 value is 0.7 or above), and then use that correlation to anticipate future values.

This may seem to be magic, but it's only statistics. The assumption that the principal variables underpinning the available data will stay relatively consistent throughout the number of periods in your projection is critical. Any projection you make based on your previous data is likely to be worthless if you're planning to buy another firm or drop product lines.

With that caution in mind, using a chart to extend the best-fit trend line into one or more future periods is the easiest technique to generate predicted values. However, you must display your data series as an XY (Scatter) chart to work with a best-fit trend line and utilize it to depict anticipated values.

The steps are as follows:

- To pick a chart, click on it.
- If your chart includes more than one data series, choose the one you wish to study.
- Select Design and then Add Chart Element.
- Trendline Additional Trendline Options
- The Trendline Format pane displays.
- Select the Trendline Options tab from the drop-down menu.
- Select Linear from the drop-down menu.
- The best-fit trend line is plotted using Excel.
- In the Forecast section, type the number of units you want to project the trend line into in the future in the Forward text box.
- (Optional) Check the option that says "Display Equation on Chart."

- (Optional) Check the option that says "Display R-Squared Value on Chart."
- Close the window.

Along with the expanded trend line, Excel shows the regression equation and the R2 value.

Extending a Linear Trend

With a linear trend, the dependent variable is proportionally connected to the independent variable. For example, you could observe that anytime interest rates (the independent variable) fall by 1%, home sales (the dependent variable) rise by 100,000 units. Similarly, you can discover that every $50,000 spent on advertising boosts firm sales (the dependent variable) by $250,000. (the independent variable).

You may use a linear connection to anticipate future periods if forecasting is part of your data analysis. The fill handle and the Series command are two tools Excel provides to help you stretch a linear trend into one or more future periods.

Calculating Linear Forecasted Values

If your analysis needs precise forecast values, you may either use the fill handle or the Series command to extend the linear trend and then use the regression equation to get the values, or you can use the best-fit trend line and then use the regression equation to calculate the values. These are simple approaches, but if the historical numbers change, you must recalculate the anticipated values. Using the TREND function is a more efficient option. Here's a quick rundown of TREND syntax:

TREND(known_ys, known_xs, new_xs, const)

TREND must be used not just with the known ys argument (a reference to the dependent values) and optionally with the known xs argument (a reference to the independent values) in this circumstance, but also with the new xs argument. The new xs parameter is a range reference or array that specifies the new independent values for which dependent values should be projected.

The following is the technique for utilizing the TREND function to compute anticipated linear trend values:

- Choose the cells where the anticipated values should appear.
- =trend(is a kind of trend.
- To indicate the dependent values, type a reference or an array.
- After that, enter a comma, and then a reference or array to represent the independent values.
- After that, type a comma, followed by a reference or array that represents the new independent values.
- Type a comma and then FALSE if you choose to use a trend beginning point of 0.
- (Select).
- Hold Ctrl+Shift and then hit Enter or click the Enter button.
- The anticipated trend values are calculated and entered as an array in Excel.

Plotting an Exponential Trend Line

I've only covered regression analysis on linear data that evolves at a steady pace up until now. However, regression analysis may be used on nonlinear data when the trend line isn't straight.

An exponential trend, which rises or declines at an increasing pace, is a frequent example of nonlinear data. The trend line mimics the graph of a number being increased to ever greater exponent values, thus the name exponential. The series 21, 22, 23 begins slowly (2, 4, 8, and so on), but by the time you reach 220, the series value has risen to 1,048,576, and 2100 is a 31-digit figure!

An exponential trend line may be used to depict such a pattern. This is a curved line that runs across the data points and cancels out the discrepancies between the ones on one side of the line and those on the other.

The steps for drawing an exponential trend line are as follows:

- To pick a chart, click on it.
- If your chart includes more than one data series, choose the one you wish to study.
- Select Design and then Add Chart Element.
- Trendline Additional Trendline Options
- The Trendline Format pane displays.
- Select the Trendline Options tab from the drop-down menu.
- Choose the Exponential option from the drop-down menu.
- The exponential trend line is shown in Excel.
- (Optional) Check the option that says "Display Equation on Chart."
- Steps 6 and 7 may be skipped if you just want to view the trend line.
- (Optional) Check the option that says "Display R-Squared Value on Chart."
- Close the window.

Exponential Trend Values Calculation

As I said in the last section, looking at an exponential trend line is a nice way to spend time. The trend line is an excellent visual aid, but it is useless when you need accurate exponential trend values. Yes, you could display the trend line and then compute the precise numbers using the exponential form of the regression equation:

BMX = y

If the data values change, you must recalculate the trend values and replot the trend line. There's just too much work!

Using the GROWTH function, which accepts up to four parameters, is a better option:

GROWTH(known_ys, known_xs, new_xs, const)

The dependent values are referenced by the known ys parameter, which is necessary. The independent values are referenced by the known xs parameter (the default is the array 1,2,3,...],n, where n is the number of known ys). The new xs input specifies the new independent values for which you want dependent values projected. The value of b in the exponential regression equation is determined by the const argument: FALSE sets it to 1, while TRUE (the default) uses the known ys to compute b.

Here are the steps to utilizing the GROWTH function to compute exponential trend values:

- Choose which cells you want the exponential values to display in.
- =growth(is a type.
- To indicate the dependent values, type a reference or an array.
- After that, enter a comma, and then a reference or array to represent the independent values.
- After that, enter a comma, then a reference or array to represent the new independent values.
- Type a comma and then FALSE if you choose to use a trend beginning point of 1.
- (Select).
- Hold Ctrl+Shift and then hit Enter or click the Enter button.
- Excel calculates and saves the exponential trend data as an array.

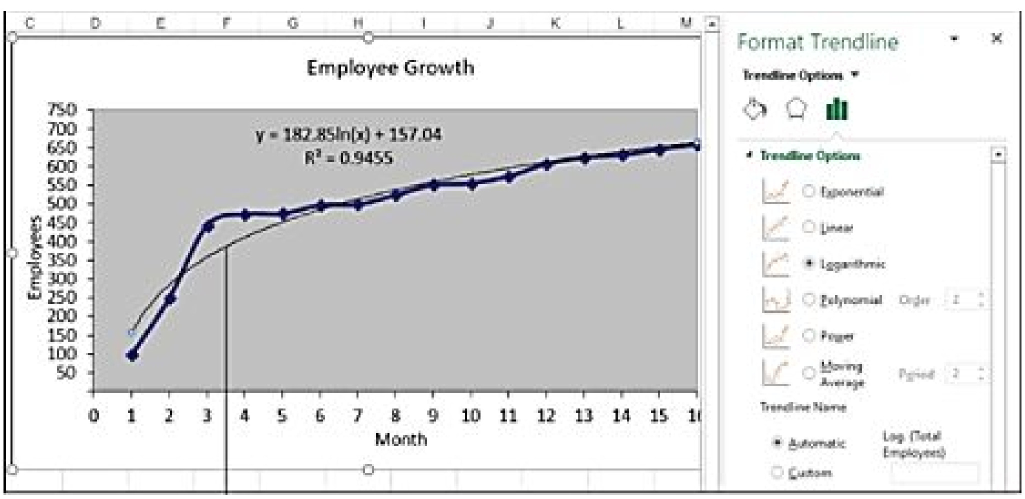
Plotting a Logarithmic Trend Line

A logarithmic trend occurs when data increases or decreases rapidly at first, then gradually slows and levels out over time. The sales pattern of a highly anticipated new product, which normally sells in big volumes for a brief period before leveling off, is an example of a logarithmic trend.

A logarithmic trend line may be used to depict such a pattern. This is a curved line that runs across the data points and cancels out the discrepancies between the ones on one side of the line and those on the other.

The steps for drawing a logarithmic trend line are as follows:

- To pick a chart, click on it.
- If your chart includes more than one data series, choose the one you wish to study.
- Select Design and then Add Chart Element.
- Trendline Additional Trendline Options
- The Trendline Format pane displays.
- Select the Trendline Options tab from the drop-down menu.
- The Logarithmic radio option should be selected.
- The logarithmic trend line is plotted in Excel.
- (Optional) Check the option that says "Display Equation on Chart."
- Steps 6 and 7 may be skipped if you just want to view the trend line.
- (Optional) Check the option that says "Display R-Squared Value on Chart."
- Close the window.



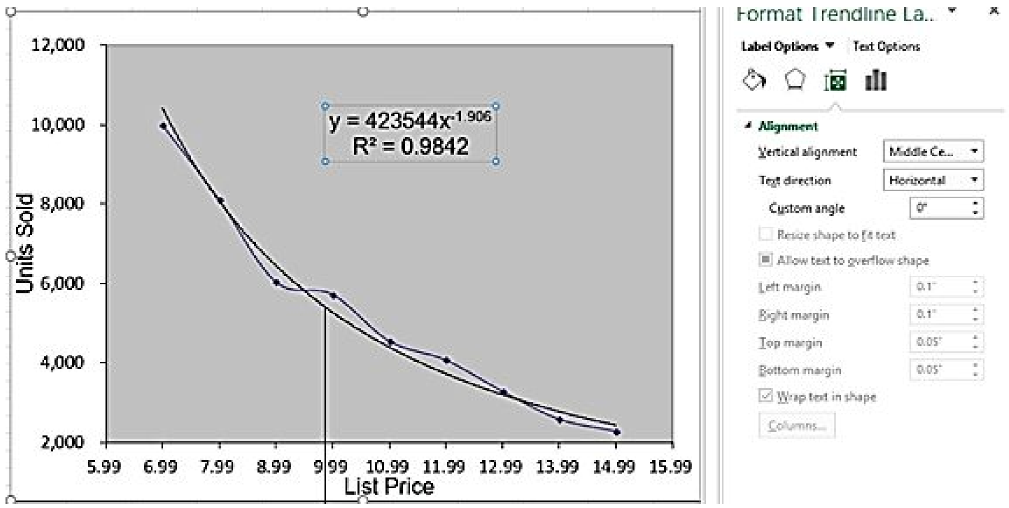
Plotting a Power Trend Line

A power trend, in which the data grows or declines continuously, provides the greatest fit in many applications of regression analysis. Such a trend is certainly neither exponential nor logarithmic, which both entail severe behavior at the trend's conclusion (in the case of exponential) or at the trend's beginning (in the case of logarithmic) (in the case of logarithmic). Revenues, earnings, and margins in successful organizations are examples of power trends, all of which demonstrate consistent rises in the pace of growth year after year.

Although a power trend seems to be linear, charting it reveals a curved best-fit line between the data points. When analyzing such data, it's typically better to start with a linear trend line. If it doesn't work, try a power trend line instead.

To draw a power trend line, follow these steps:

- To pick a chart, click on it.
- If your chart includes more than one data series, choose the one you wish to study.
- Select Design and then Add Chart Element.
- Trendline Additional Trendline Options
- The Trendline Format pane displays.
- Select the Trendline Options tab from the drop-down menu.
- The Power radio button should be selected.
- The power trend line is plotted in Excel.
- (Optional) Check the option that says "Display Equation on Chart."
- Steps 6 and 7 may be skipped if you just want to view the trend line.
- (Optional) Check the option that says "Display R-Squared Value on Chart."
- Close the window.



Plotting a Polynomial Trend Line

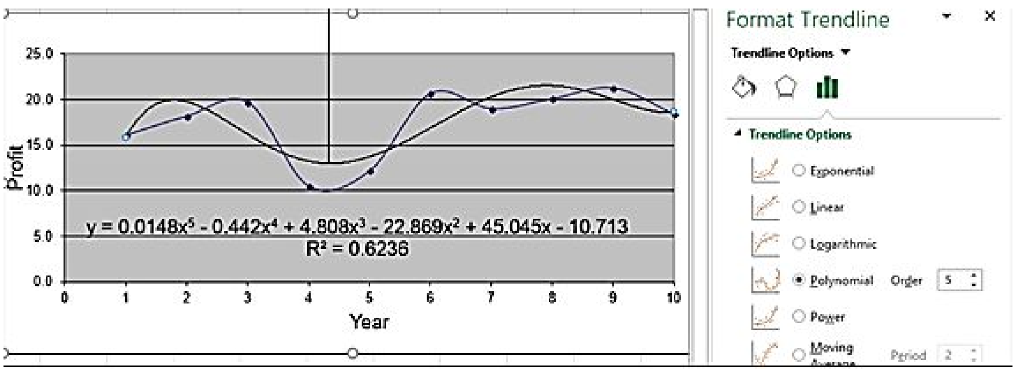
The connection between the dependent and independent variables does not always move in the same direction in real-world circumstances. That would be much too simple. Data such as unit sales, profits, and expenses, for example, may go up and down rather than growing continuously – consistently, as in a linear trend, rapidly, as in an exponential or logarithmic trend, or slowly, as in a powerful trend.

A polynomial trend line, which is a best-fit line of many curves obtained using an equation that employs multiple powers of x, maybe plotted to depict such a trend. The order of the polynomial equation is the number of powers of x. The greater the order, the more closely the curve matches your current data, but the more unexpected your anticipated numbers are.

If you already have a chart, you may add a polynomial trend line by following these steps:

- To pick a chart, click on it.
- If your chart includes more than one data series, choose the one you wish to study.
- Select Design and then Add Chart Element.
- Trendline Additional Trendline Options
- The Trendline Format pane displays.
- Select the Trendline Options tab from the drop-down menu.

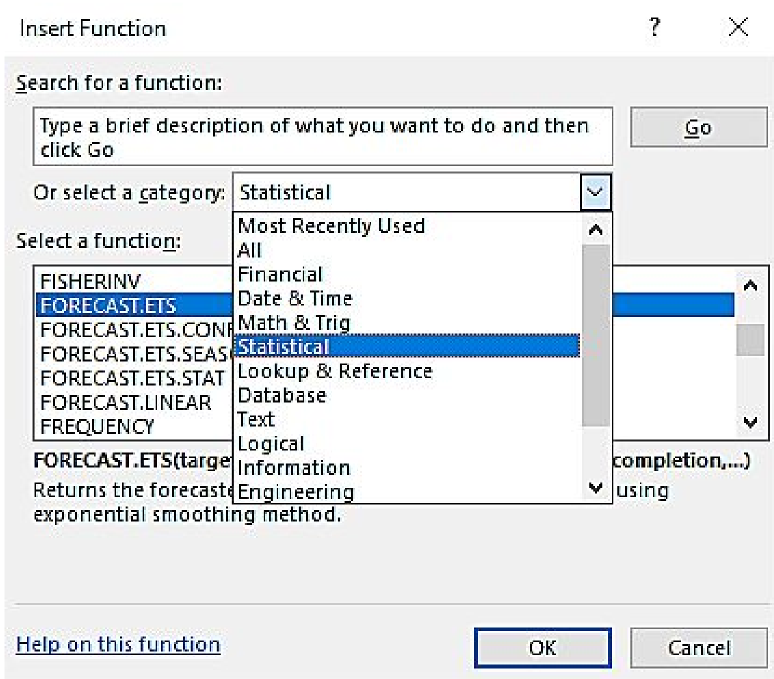
- Choose Polynomial from the drop-down menu.
- To change the order of the polynomial equation, use the Order spin button arrows.
- The polynomial trend line is shown in Excel.
- (Optional) Check the option that says "Display Equation on Chart."
- Steps 7 and 8 may be skipped if you just want to view the trend line.
- (Optional) Check the option that says "Display R-Squared Value on Chart."
- Close the window.



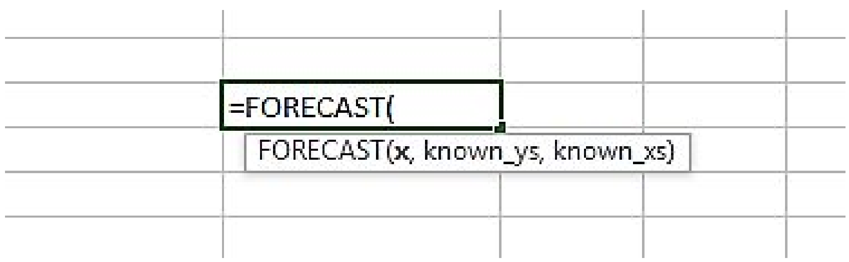
Creating a Forecast Sheet.

The forecast function is the most basic forecasting function you can have. It forecasts the chosen repetition series, but we should first get all of the other known sequences and known outcomes. To anticipate the upcoming demand, the forecast function just employs the Moving Average Forecast technique. If we don't know X, we've input the number manually, starting with 1 for the initial value and working our way up.

Now, on the formula tab, pick Insert. On the dialog box, click the down arrow and choose Statistical. Pick Forecast function.

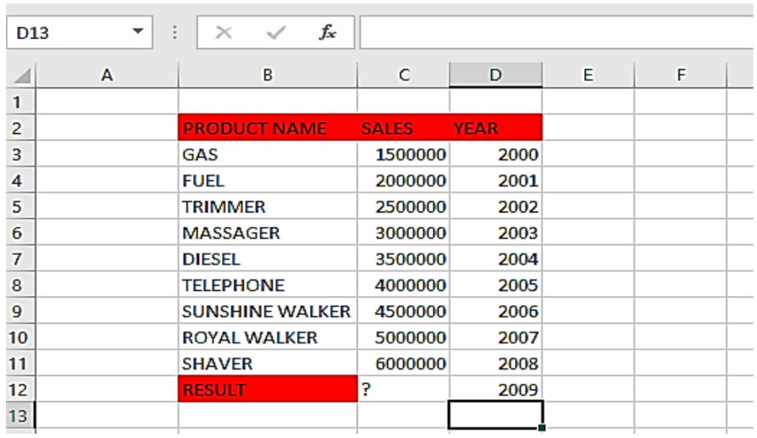


The formula for this is



Example;

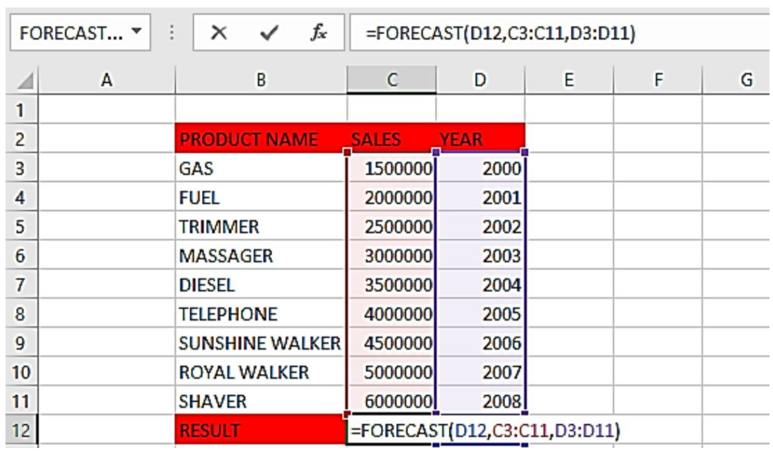
Here, this function will help us predict next month's sales data. Let's say a company has monthly sales data. Then, the board wants to figure out the sales forecasting so that they can have an idea of their future month sales. In my table below, we are to predict that of 2009.



D13

	A	B	C	D	E	F
1						
2		PRODUCT NAME	SALES	YEAR		
3		GAS	1500000	2000		
4		FUEL	2000000	2001		
5		TRIMMER	2500000	2002		
6		MASSAGER	3000000	2003		
7		DIESEL	3500000	2004		
8		TELEPHONE	4000000	2005		
9		SUNSHINE WALKER	4500000	2006		
10		ROYAL WALKER	5000000	2007		
11		SHAVER	6000000	2008		
12		RESULT	?	2009		
13						

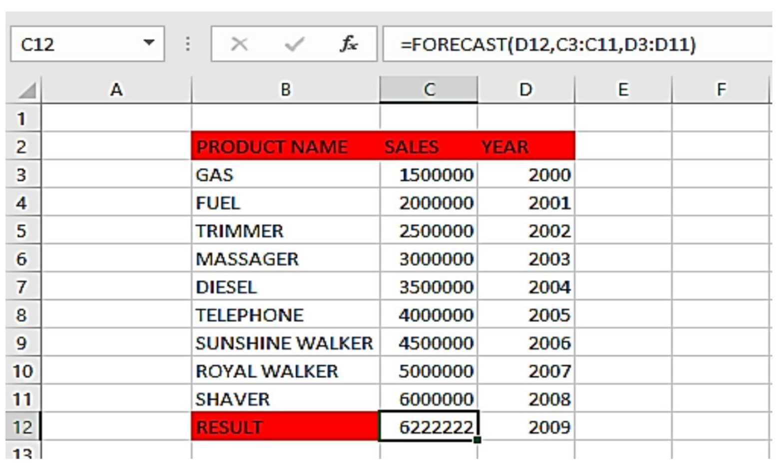
On the empty cell, type in the FORECAST function. **=FORECAST(D12,C3:C11,D3:D11)**.



FORECAST... =FORECAST(D12,C3:C11,D3:D11)

	A	B	C	D	E	F	G
1							
2		PRODUCT NAME	SALES	YEAR			
3		GAS	1500000	2000			
4		FUEL	2000000	2001			
5		TRIMMER	2500000	2002			
6		MASSAGER	3000000	2003			
7		DIESEL	3500000	2004			
8		TELEPHONE	4000000	2005			
9		SUNSHINE WALKER	4500000	2006			
10		ROYAL WALKER	5000000	2007			
11		SHAVER	6000000	2008			
12		RESULT	=FORECAST(D12,C3:C11,D3:D11)				

Press **ENTER**.



C12 =FORECAST(D12,C3:C11,D3:D11)

	A	B	C	D	E	F
1						
2		PRODUCT NAME	SALES	YEAR		
3		GAS	1500000	2000		
4		FUEL	2000000	2001		
5		TRIMMER	2500000	2002		
6		MASSAGER	3000000	2003		
7		DIESEL	3500000	2004		
8		TELEPHONE	4000000	2005		
9		SUNSHINE WALKER	4500000	2006		
10		ROYAL WALKER	5000000	2007		
11		SHAVER	6000000	2008		
12		RESULT	6222222	2009		
13						

You can modify your work by adding a graph to it.

CHAPTER ELEVEN

ANALYZING DATA USING STATISTICS

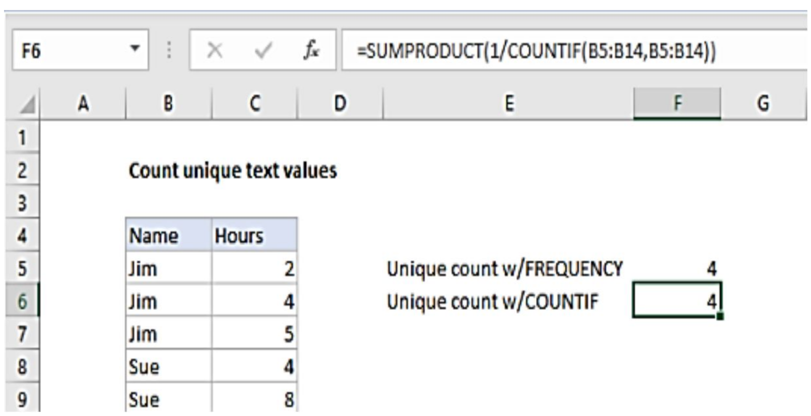
Counting Things

You count the number of values that match a certain range. Counting values in a range is done with the use of the SUMPRODUCT and COUNTIFS functions. It counts how many cells match one or more conditions/requirements. The COUNTIFS function uses this formula **=COUNTIFS(criteria_range1, criteria1, [criteria_range2, criteria2]…)**

Explanation:

- Criteria_range 1 is the data range that will be calculated with the use of criteria1.
- Criteria1 is the condition that defines which cells are to be counted.
- Criteria_2 & Criteria2 are voluntary; they are applied when there is an existence of over one criterion.

In the image below, the formula in F6 is **=SUMPRODUCT(1/COUNTIF(B5:B14, B5:B14))**



Explanation:

COUNTIF is used from B5:B15 which uses the same values as criteria **COUNTIF(B5:B14, B5:B14).** We have ten values for criteria, so we are to bring back an array that has ten results such as **{3;3;3;2;2;3;3;3;2;2}.** These numbers signify counts. For instance, Jim displayed three times, Mark displayed three times, etc.

The array will be configured as a divisor. The number 1 will be the numerator. When you are done dividing, you will have another array as seen below;

{0.333333333333333;0.333333333333333;0.333333333333333;0.5;0.5;0.333333333333333;0.333333333333333;0.333333333333333;0.5;0.5}

Every value that is displayed once in that range will be displayed as 1s while values that are displayed more than once will be displayed as fractional values.

Counting Numbers

The COUNT function counts the number of cells having numeric values in a given range. COUNT, on the other hand, excludes cells that contain text (including numbers represented as text), the logical values TRUE or FALSE, and cells that are empty. (It's worth mentioning that COUNT includes cells with dates or times since Excel regards those forms of data as numbers.)

The syntax is as follows:

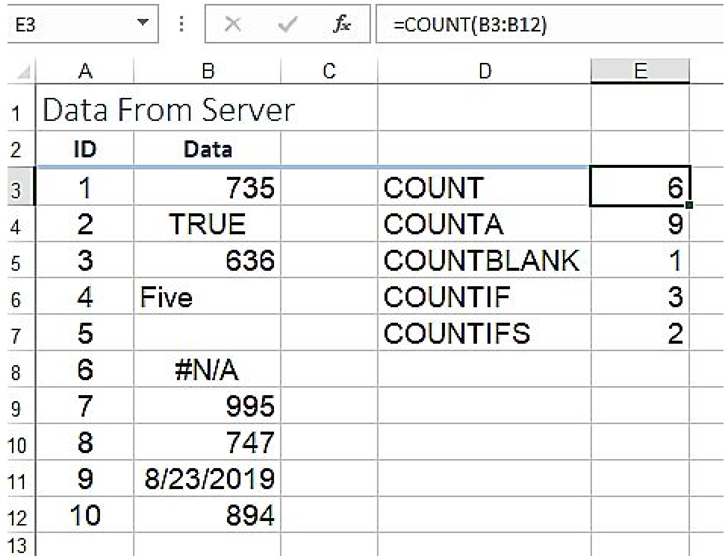
=COUNT(value1[, value2, …])

Cell or range references are represented by value1, value2, and so on. Use the following formula to find out how many numeric values are in the range B3:B12 in the worksheet displayed in the image using the COUNT function

=COUNT(B3:B12)

COUNT delivers a count of the numeric values in a range.

COUNT yields 6 as indicated in cell E3.



E3 =COUNT(B3:B12)

	A	B	C	D	E
1	Data From Server				
2	ID	Data			
3	1	735		COUNT	6
4	2	TRUE		COUNTA	9
5	3	636		COUNTBLANK	1
6	4	Five		COUNTIF	3
7	5			COUNTIFS	2
8	6	#N/A			
9	7	995			
10	8	747			
11	9	8/23/2019			
12	10	894			
13					

Counting Nonempty cells

The COUNTA function counts the number of nonempty cells inside a given range. It makes no difference what data types the cells contain: integers, dates, times, logical values, or text. A cell is included in the COUNT A total as long as it includes anything. The COUNTA syntax is as follows:

=COUNTA(value1[, value2, …])

Cell or range references are represented by value1, value2, and so on. For example, in the spreadsheet given earlier in the image, apply the following formula to compute how many non-empty values are in the range B3:B12.

=COUNTA(B3:B12)

COUNTA yields the number 9 as seen in cell E4 in the image.

Counting empty cells

The COUNTBLANK function counts the number of empty cells within a given range, which is the polar opposite of COUNTA. The COUNTBLANK **syntax is as follows:**

=COUNTBLANK(value1[, value2, …])

Cell or range references are represented by value1, value2, and so on. Use the following calculation to find out how many empty values are in the range B3:B12 in the worksheet shown previously in the image using COUNTBLANK:

=COUNTBLANK(B3:B12)

Counting cells that match criteria

The COUNTIF function in Excel is used to enumerate cells that fulfill given criteria or conditions inside a defined range.

For instance, a COUNTIF formula may be used to determine the number of cells in your worksheet that consists of a

number that is higher than or lesser than the value you give. COUNTIF is also often used in Excel to count cells that contain a given word or begin with a specific letter (s).

The COUNTIF function has a very basic syntax: **=COUNTIF(range, criteria)**

It has just two arguments which are Range and Criteria. The range here defines one or multiple cells for counting while the Criteria here defines the condition which lets the function of the cell that is needed for counting. You write in the range as you do normally such as B1:B15. You can put in the criteria as "**10", B2, ">=10", "some text"**

Counting cells that match multiple criteria

The COUNTIFS function may be used to display the number of cells that satisfy a specified condition. COUNTIF may be used to count items based on dates, numbers, text, and other parameters.

COUNTIFS additionally requires the use of logical expressions (>,>,=).

COUNTIFS is a function that counts cells that satisfy several criteria. Since we provide the same range for two criteria in this situation, each cell in the range must fulfill both requirements to be tallied. The formula is **=COUNTIFS(range,">=X",range,"<=Y").**

- For greater than or equal to, use >=.
- For less than or equal to, use =.

So, if we wish to count depending on conditions in our dataset, we use the following formula: =COUNTIFS(B2:B9,">=80",B2:B9,"<=90")

	A	B	C	D	E
1	Name	Score		Criteria	Countif
2	Adri	82		Beetween 80 and 90	4
3	Sara	91			
4	Michael	79			
5	Jim	86			
6	Tyler	77			
7	Jochua	81			
8	John	90			
9	Mike	70			

Counting Permutations

Calculating the permutations, which is the number of ways a subset of data may be organized in any sequence, without repetitions, given a data set, is a common approach to count things. Let's say your data collection contains the letters A, B, C, and D.

Here are all the possible combinations of any two of these letters that do not repeat:

AB, AC, AD, BA, BC, BD, CA, CB, CD, DA, DB, DC

The following are the two most important qualities of a permutation:

Because the order is critical, AB and BA are considered separate groups.

The groups' AA, BB, CC, and DD aren't included in the permutations since repeats aren't permitted.

When picking a subset from a data collection, Excel's PERMUT function counts the number of permutations possible (or a sample from a population). The PERMUT **syntax is as follows:**

=PERMUT(number, number_chosen)

The number of items in the set is the number, and the number of things in each subset is the number chosen. For example, if you have a population of four items and two items in each subgroup, you may use the formula to get the number of permutations.

=PERMUT(4, 2)

The method returns the number 12, indicating that there are 12 possible ways to choose two things from a group of four.

Allowing repeats in the subset is a variant on the permutation theme (such as AA, BB, CC, and DD from the ABCD set). In such a situation, utilize the PERMUTATIONA function in Excel, which has the same syntax as PERMUT.

=PERMUTATIONA(number, number chosen) =PERMUTATIONA(number, number chosen) =PERMUTATIONA(

To compute the number of permutations in which two things are chosen from a population of four items with duplicates permitted, for example, use the formula:

PERMUTATIONA PERMUTATIONA PERMUTATIONA (4, 2)

The final score is 16.

Counting combinations

When the order isn't crucial, it's frequently beneficial to count items by computing the combinations, which is the number of ways a subset of that data may be organized without repetitions given a data set (that is, each subset is unique). Let's say your data collection contains the letters A, B, C, and D. Without repeating everything, **here are all the many ways you may group any two of these letters:**

AB, AC, AD, BC, BD, CD

There are two main qualities of a combination:

The subsets must be distinct, which means that the order of the subsets is irrelevant. The subsets AB and BA, for example, are regarded to be the same subset.

The groups AA, BB, CC, and DD aren't included in the combinations since repeats aren't permitted.

When picking unique subsets from a data source, Excel's COMBIN function counts the number of available combinations (or a sample from a population). The COMBIN syntax is as follows:

=COMBIN(number, number_chosen)

The number of items in the set is the number, and the number of things in each subset is the number chosen. For example, if you have a population of four items and two items in each subgroup, you may use the formula to get the number of combinations.

=COMBINATION (4, 2

The method returns the number 6, indicating that there are six possible ways to choose two things from a group of four.

If you wish to add repetitions (such as the ABCD set's AA, BB, CC, and DD), use Excel's COMBINA function, which has the same syntax as COMBIN:

=COMBINA(number, number chosen) =COMBINA(number, number chosen) =COMBINA(number

To compute the number of unique combinations in which two things are chosen from a population of four items with repetitions permitted, for example, use the formula:

=COMBINATIVE (4, 2)

The final score is ten.

Averaging Things

The sum of two or more numeric values divided by the count of the numeric values yields an average. You can compute the average by writing a custom formula if you like, but this is only feasible for a limited number of elements. Calculating averages using Excel worksheet functions is quicker and more efficient for bigger datasets.

The mean is how statisticians refer to an average. A typical value in a distribution or a value that reflects the majority of instances is referred to as the central tendency. The mean, median, and mode are the most widely used metrics of central tendency.

Calculating an average

The AVERAGE function, which utilizes the following syntax to calculate the average (or mean) of a group of data, is the go-to worksheet function.

AVERAGE(number1[, number2,...]) is a function that computes the average of two numbers.

Up to 255 parameters may be entered, each of which can be a number, a cell, a range, a range name, or an array (a collection of values wrapped in curly braces, such as 20, 25, 25, 30). If a cell contains zero, Excel includes it in the calculation; however, if a cell is blank, Excel excludes it from the computation

To calculate the average of the values in the range D3:D19, for example, use the formula.

=AVERAGE(D3:D19)

Calculating a conditional average

You may need to average the values in a range in your data analysis, but only those values that meet a certain requirement. This may be done using the AVERAGEIF function, which is a combination of AVERAGE and IF, and averages just those cells in a range that fulfill the criterion you provide.

AVERAGEIF is a function that accepts up to three arguments:

=AVERAGEIF(range, criteria[, average_range])

The range argument specifies the range of cells to be used to test the condition; the criteria argument specifies which cells are in the range to average using a logical expression surrounded by double quotation marks, and the optional average range argument specifies the range from which the average values should be taken. If you don't provide an average range, Excel will use range to calculate the average.

Excel only adds the average range cells that match the cells in range and fit the requirements.

Calculating an average based on multiple conditions

Getting the average of all numbers that meet a certain condition

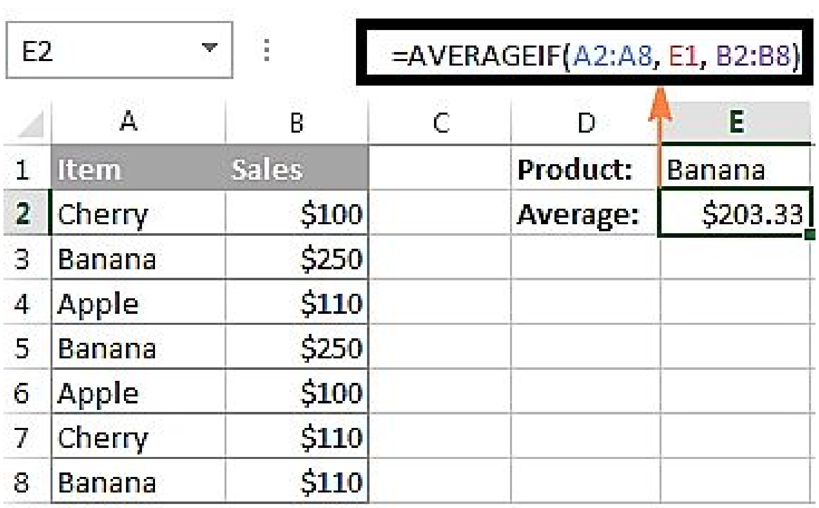
Excel's AVERAGEIF function computes the average (arithmetic aggregate) of all cells that fulfill a set of conditions. The formula is: **AVERAGEIF(range, criteria, [average_range]).** The first two parameters to the AVERAGEIFS function are necessary, **while the final one is optional:**

- Range - the number of cells that will be compared to the supplied criteria.
- The criterion used to choose which cells to average is known as the criteria. The criterion may be specified as a number, a logical expression, a text value, or a cell reference, for example, 5, ">5", "cat," or A2.
- Average range - the range of cells to average (optional). If the range parameter is omitted, the formula will compute an average of the values in it.

EXAMPLE;

The AVERAGEIF function in Excel is most often used to obtain an average of cells that perfectly fit a specific requirement. Let's average just the sales (B2:B8) for the Banana orders (A2:A8) **in this illustration:**

=AVERAGEIF(A2:A8, "banana", B2:B8). You can put the formula in an empty cell. **=AVERAGEIF(A2:A8, E1, B2:B8)**


E2 =AVERAGEIF(A2:A8, E1, B2:B8)

	A	B	C	D	E
1	Item	Sales		Product:	Banana
2	Cherry	$100		Average:	$203.33
3	Banana	$250			
4	Apple	$110			
5	Banana	$250			
6	Apple	$100			
7	Cherry	$110			
8	Banana	$110			

Getting the average of all numbers that meet two or more conditions.

The AVERAGEIFS function is the plural version of the AVERAGEIF function. It takes many factors into account and provides the average (arithmetic average) of units that match all of the requirements.

The formula is; **AVERAGEIFS(average_range, criteria_range1, criteria1, [criteria_range2, criteria2], …)**

The following are the parameters to the AVERAGEIFS function:

- The average range parameter specifies the range of cells to average.
- Criteria range1, Criteria range2, Criteria range3, Criteria range4, Criteria range5, Criteria range - 1 to 127 ranges to be compared to the set of criteria The first criteria range is necessary; the others are optional.
- Criteria1, criteria2…. means the cell that is to be averaged. It can be provided in a number form, logical expression, cell reference, or text value.

The Excel AVERAGEIFS function, as previously stated, finds the average of cells that fulfill all of the conditions you give (AND logic). In principle, it works similarly to AVERAGEIF, with the exception that you may use it in formulas with multiple criteria ranges and criteria.

Calculating the median, mode, variance, standard deviation

With every piece of data, descriptive statistics are among the core "should learn" concepts. It offers us an overall picture of data patterns, such as learning about the range, the mean, mode, and median, as well as the variance and standard deviation, , Count, maximum, and minimum are all used.

Descriptive statistics are helpful because they enable you to describe a vast quantity of data. Let's imagine you have information on one thousand people's earnings. Nobody wants to read a thousand bits of data, and even if they did, they will not be capable of extracting any relevant information. When you condense it, though, it does become useful: an average pays or median income is a lot simpler to comprehend than lots of data. Below is an image of its features;

Statistic	Description
Mean	Shows the arithmetic mean of the sample data.
Standard Error	Shows the standard error of the data set
Median	Shows the middle value in the data set
Mode	Shows the most common value in the data set.
Standard Deviation	Shows the sample standard deviation measure for the dataset
Sample Variance	Shows the sample variance for the data set
Kurtosis	Shows the kurtosis of the distribution.
Skewness	Shows the skewness of the data set's distribution.
Range	Shows the difference between the largest and smallest values in the data set.
Minimum	Shows the smallest value in the data set.
Maximum	Shows the largest value in the data set.
Sum	Adds all the values in the data set together to calculate the sum
Count	Counts the number of values in a data set.
Largest(X)	Shows the largest X value in the data set.
Smallest(X)	Shows the smallest X value in the data set.

How do you calculate this?

- **First:** Enter your information into Excel in a single column. For instance, if your data collection has ten items, enter them into fields A1 through A10.
- **Second:** Go to the "**Data" tab**, then to the "Analysis" group, and finally to "Data Analysis."
- **Third:** On the pop-up Data Analysis box, choose "Descriptive Statistics."

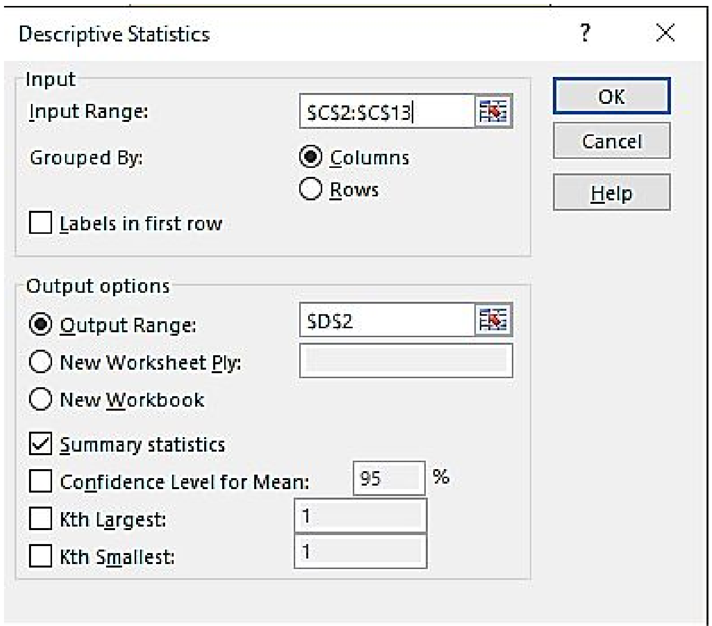
- **Fourth:** In the "Input Range" text box, enter an input range. In the box, enter "A1:A10" for example.
- **Fifth:** Once you have named the column in row 1, click the "Labels in the first row" check box; otherwise, leave it unmarked.
- **Sixth:** In the "Output Range" box, enter a cell location. Type "C1" as an example. Make sure there are no data in two neighboring columns.
- **Seventh:** To show Excel descriptive statistics, tick the "Summary Statistics" option and then click "OK." In the column you chose as the Output Range, a set of descriptive statistics will be supplied.

Let's, work with an example.

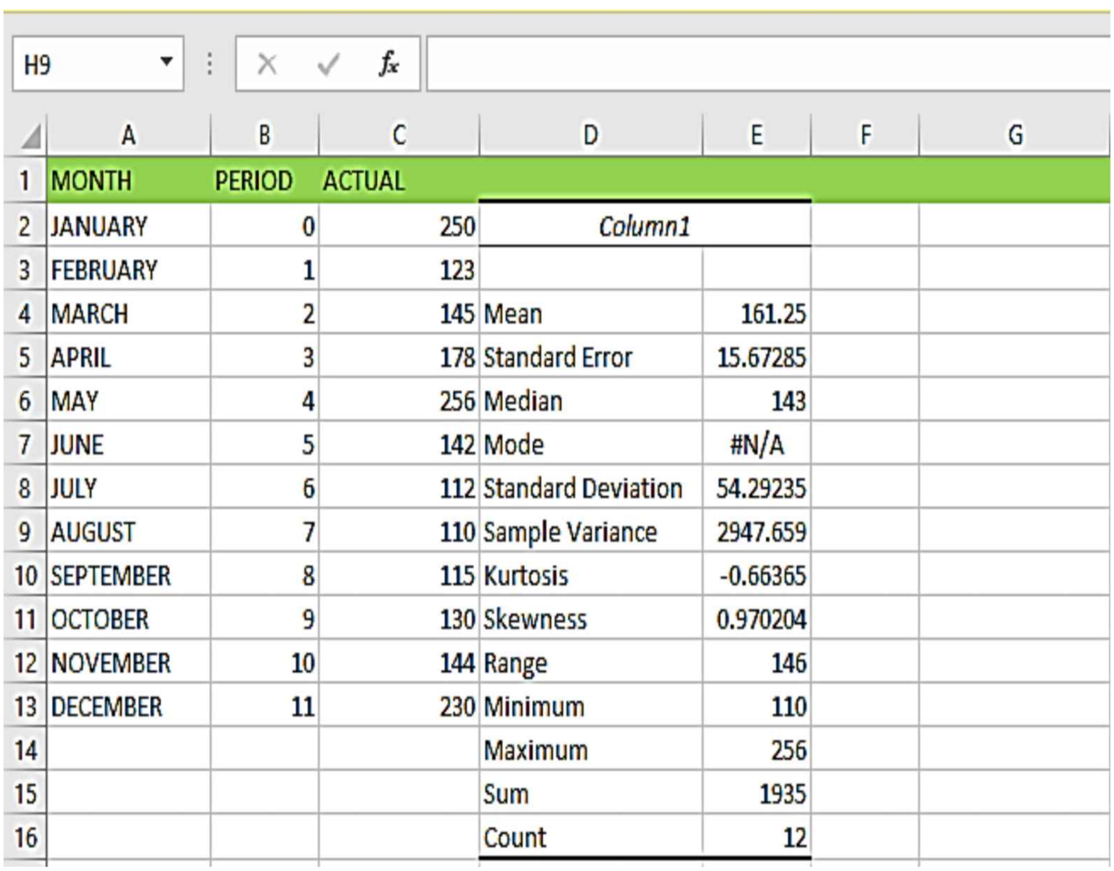
F3

	A	B	C	D	E	F
1	MONTH	PERIOD	ACTUAL			
2	JANUARY	0	250			
3	FEBRUARY	1	123			
4	MARCH	2	145			
5	APRIL	3	178			
6	MAY	4	256			
7	JUNE	5	142			
8	JULY	6	112			
9	AUGUST	7	110			
10	SEPTEMBER	8	115			
11	OCTOBER	9	130			
12	NOVEMBER	10	144			
13	DECEMBER	11	230			

So, follow the steps above to the third three. With my data above, I will select the input range as $C$2:$C$13. I have named my first row, so I will check the Labels in the First-row box. My output range will be $D$2. Click the box on Summary Statistics. Select OK.



You will see the descriptive statistics on your worksheet. You will see the mean, median, mode, and other useful stats of your data.



	A	B	C	D	E	F	G
1	MONTH	PERIOD	ACTUAL				
2	JANUARY	0	250	*Column1*			
3	FEBRUARY	1	123				
4	MARCH	2	145	Mean	161.25		
5	APRIL	3	178	Standard Error	15.67285		
6	MAY	4	256	Median	143		
7	JUNE	5	142	Mode	#N/A		
8	JULY	6	112	Standard Deviation	54.29235		
9	AUGUST	7	110	Sample Variance	2947.659		
10	SEPTEMBER	8	115	Kurtosis	-0.66365		
11	OCTOBER	9	130	Skewness	0.970204		
12	NOVEMBER	10	144	Range	146		
13	DECEMBER	11	230	Minimum	110		
14				Maximum	256		
15				Sum	1935		
16				Count	12		

Finding the Rank

One of the most frequent methods for assessing data is to rank it. Comparing categories and items may be made easier by ranking them. The nice aspect about ranking is that you can see what's at the upper and lower part. You could save a huge amount of time and work by using ranking in a pivot table, and it will aid us in your evaluation.

The excel rank function is used to determine the optimum sequence position of any chosen cell within a particular hierarchy or range, and it is only relevant to numbers. That's because Rank can only be quantified in terms of numbers. If we have five numbers and wish to know the rank (or position) of any of them, we merely select the range and then the order in which we want them to appear.

There are different rank functions in Excel which are RANK.AVG, RANK.EQ, and RANK. Let me work with an example.

I have a dataset that consists of twelve teams that joined in the Kabaddi tournament. It includes the team names and their total points. So, I want to rank each of the teams as I compared it to the rest of the teams.

	A	B	C
1	**Team**	**Points**	**Rank**
2	Patna Pirates	12	
3	Gujrat Fortunegaints	105	
4	U Mumba	25	
5	Bengaluru Bulls	63	
6	Bengal Warriors	15	
7	UP Yodha	39	
8	Puneri Paltan	76	
9	Jaipur Pink Panthers	17	
10	Haryan Steelars	83	
11	Tamil Thalaivas	61	
12	Telugu Titans	31	
13	Dabang Delhi	44	

Here, we will use the RANK.EQ function. Put the function rank function in cell C2. Then, input the cells that you want to rank.

RANK.EQ | =RANK.EQ(B2,$B$2:$B$13)

	A	B	C
1	**Team**	**Points**	**Rank**
2	Patna Pirates	12	=RANK.EQ(B2,$B$2:$B$13)
3	Gujrat Fortunegaints	105	
4	U Mumba	25	
5	Bengaluru Bulls	63	
6	Bengal Warriors	15	
7	UP Yodha	39	
8	Puneri Paltan	76	
9	Jaipur Pink Panthers	17	
10	Haryan Steelars	83	
11	Tamil Thalaivas	61	
12	Telugu Titans	31	
13	Dabang Delhi	44	

Then, press Enter and use the drag and fill feature to fill in other cells.

C2 | =RANK.EQ(B2,$B$2:$B$13)

	A	B	C
1	**Team**	**Points**	**Rank**
2	Patna Pirates	12	12
3	Gujrat Fortunegaints	105	1
4	U Mumba	25	9
5	Bengaluru Bulls	63	4
6	Bengal Warriors	15	11
7	UP Yodha	39	7
8	Puneri Paltan	76	3
9	Jaipur Pink Panthers	17	10
10	Haryan Steelars	83	2
11	Tamil Thalaivas	61	5
12	Telugu Titans	31	8
13	Dabang Delhi	44	6

This also works for a Pivot Table.

1. In the pivot table that you intend to measure the ranking, add the value field two times.
2. Right-click on any of the cells in the second data column to choose them.
3. Select "Show Values As" from the drop-down menu.

4. You have two choices for adding ranking: "Rank Smallest To Largest" or "Rank Largest To Smallest." Choose whichever one you like.
5. The column values will be converted to rankings, and then you may sort the data to see how it ranks.

Note that the rank will be modified when you filter the pivot table.

In Source Data, Using RANK.EQ and RANK.AVG

This approach is a little more difficult, but it works perfectly. The advantage of utilizing RANK.EQ and RANK.AVG is that you don't have to modify your pivot table in any way. Simply take these few instructions below.

1. **Add this formula =IF(COUNTIF(C$2:C2,C2)>1,"",SUMIFS($E$2:$E$1507,$C$2:$C$1507,C2))** in the formula bar after inserting your raw data. For each category in the column, the formula will add a single total. You may then use that sum to determine where each category ranks.
2. **Below your data, include two extra columns.** Then, enter this formulas **=IF(H2="",0,RANK.EQ(H2,$H$2:$H$1507,1))**

=IF(H="",0,RANK.AVG(H2,$H$2:$H$1507,1)). The rating for the category in your data dump will be calculated using AVG. Both of these routines were used to generate various ranking kinds.

3. Then, using this data dump, generate a pivot table similar to the one below. To determine the ranking, you can use either of the columns.

Month	Quantity	RANK.EQ	RANK .AVG
Jun	71	1	1
Jul	77	2	2.5
Mar	77	2	2.5
Sep	82	4	4
Feb	88	5	5
Aug	93	6	6
May	99	7	7
Jan	110	8	8
Nov	121	9	9
Dec	148	10	10
Apr	192	11	11
Oct	348	12	12

With this method, the filter you use on the data will not affect the ranking.

In a Pivot Table, create a separate Rank Column:

You may create a manual distinct column for ranking rather than using formulae or any other way. This function may be used to add ranks to a specific instance.

Simply take these few instructions below;

1. Select a pivot table and organize the data as desired, ascending or descending.
2. Add the formulae below to the next two columns beyond the pivot table.

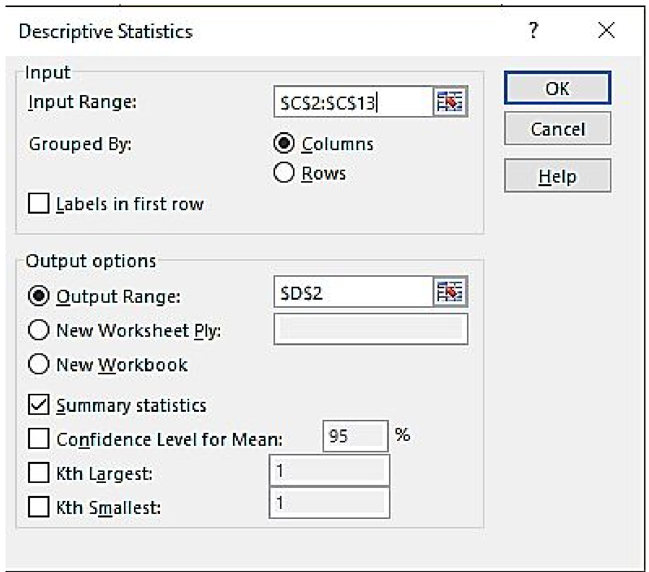
=RANK.EQ(E4,$E$4:$E$15,1)

=RANK.AVG(E4,$E$4:$E$15,1)

3. Drag them. You will see the ranking along with the pivot table.

Determining the Nth Largest and Smallest Value

With these steps used above, you will find the largest and smallest value within the descriptive statistics column. This time, you will have to tick the box on the Kth Largest and Kth Lowest boxes.



Creating a Frequency Distribution using Groups

When you organize a vast quantity of data into a grouped frequency distribution, you may detect patterns in the data more easily. For instance, with student test results, the first category may score less than or equal to 50, the second 51 to 60, and so on, up to scores between 91 and 100. To get the number of occurrences in each category, use the Excel FREQUENCY function:

FREQUENCY(data_array, bins_array)

FREQUENCY accepts two arguments: data array and bins array. the data array is the list of values to the group, and the bins array is the list of groupings (also known as bins) to utilize. FREQUENCY is entered as an array formula in the same number of cells as the number of groups. If you had six groups, for instance, you would put the formula into six cells. The steps are as follows:

Choose the cells where the aggregated frequency distribution should be shown.

- =frequency(is a frequency type.
- You may either type in or choose the things you'd want to group.
- Enter or pick the list of groups behind a comma.

Keep the number of groups in your frequency distribution to a minimum, five to ten is a decent amount. You may lose your capacity to easily communicate information if you have too few or too many groups. Trends may be hidden by using too few intervals, while details can be hidden by using too many intervals. It's also a good idea to keep your intervals simple. Five, ten, or twenty-minute intervals are appropriate since they are simple to comprehend. Start your interval with a number that is divisible by the interval size, making it easier to interpret your frequency distribution. Finally, the number of values in each period should be the same. This, once again, makes your frequency distribution simple to comprehend.

- (Select).
- Hold down Ctrl+Shift and then click the Enter button or press Ctrl+Shift+Enter.

Finding the correlation

Correlation is a measure of how closely two sets of data are related. Whether you have monthly numbers for advertising costs and sales, for example, you could ask if more advertising expenses result in more sales, or if the two values are connected.

It's important to remember that a connection does not imply that one item causes the other. You can only claim that one number differs from the other.

The CORREL function in Excel is used to discover a correlation:

CORREL CORREL CORREL (array1, array2)

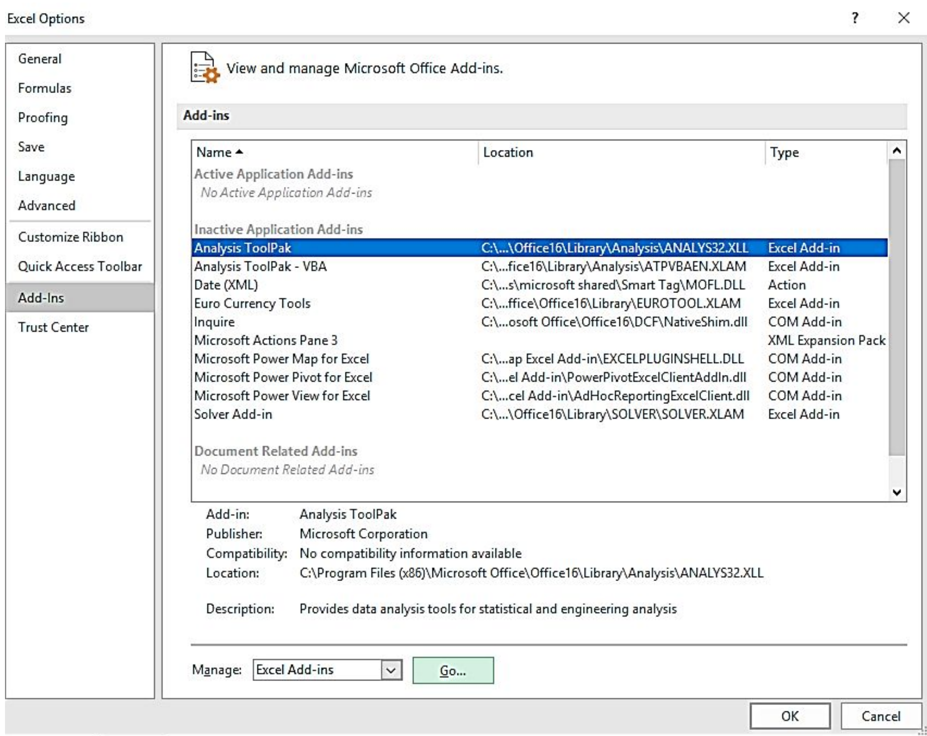
CORREL has two arguments: array1 and array2, which are two numeric lists. The correlation coefficient, which is a value between –1 and 1, is returned by CORREL. Whether the connection is positive (+) or negative (–) is indicated by the sign.

CHAPTER TWELVE

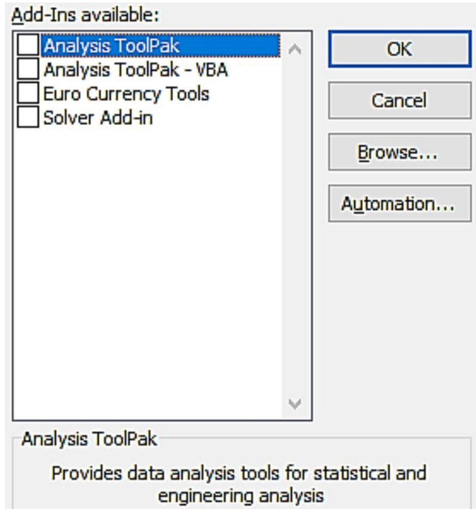
ANALYZING DATA USING DESCRIPTIVE STATISTICS

Loading the Analysis ToolPak

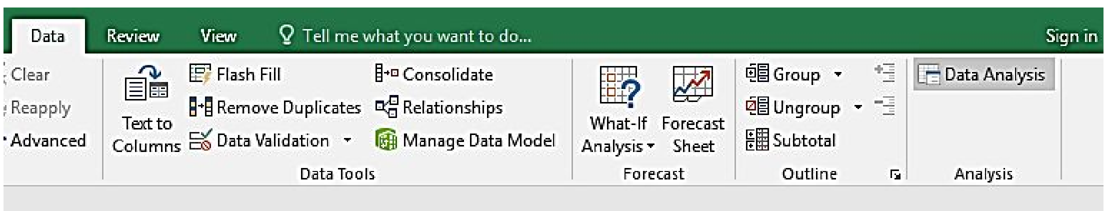
Click on File and select Options. In the dialog box that displays, click Add-Ins choose Excel Add-Ins, and click GO.



The Add-Ins dialog box will open. Click on Analysis ToolPak. Click Ok.



The tool will be added to the Data Analysis group under the Data Tab.



Calculating a Moving Average

By using the AVERAGE function in several iterations, the Moving Average function in Excel is used to provide the average of moving iteration data. The dataset, which may include several ebbs and flows, is smoothed out using a moving average.

We may utilize an integrated program for Moving Average, which can be found under the Data menu ribbon's Data Analysis option. Pick the input range and output cell for this, and the smoothed moving average data will be returned instantly.

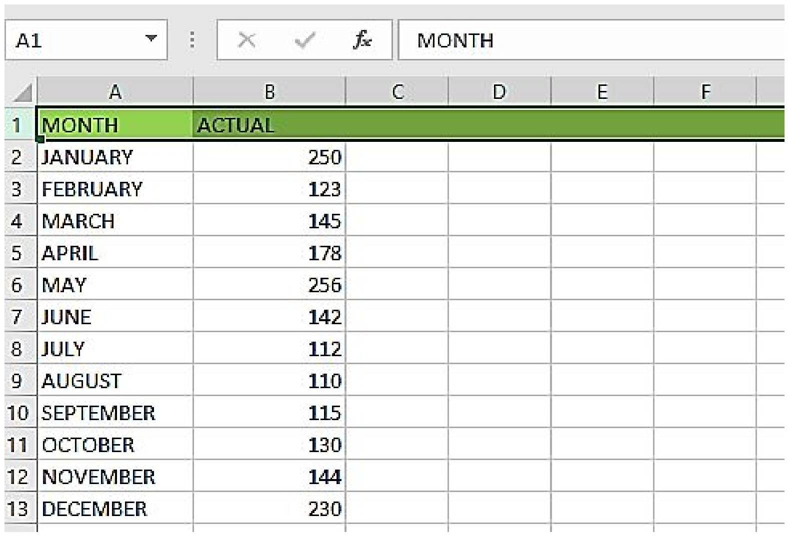
Pick at most the latest three iteration data if we wish to utilize the AVERAGE function. In several disciplines, the moving average approach is commonly utilized in Sales Forecasts and Estimation of the Next Quantity.

Where to find this tool;

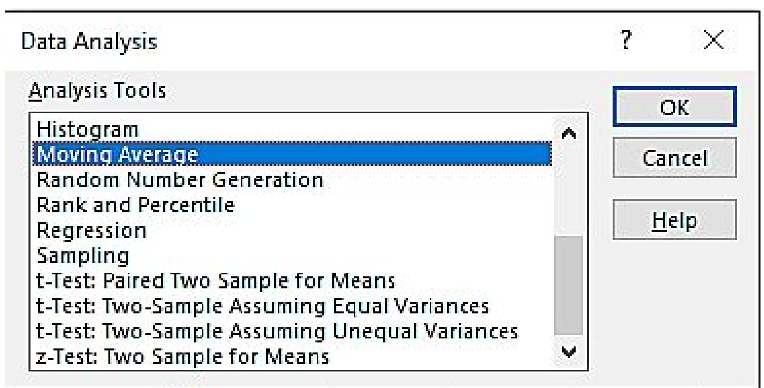
The tool is in-built, yes, but you have to unleash it from where it is. You can find it under the ANALYSIS TOOLPAK option in Excel. You get it on the

Data Analysis tab as explained above.

When you click on it, you will find the Moving Average option. Now, let’s have an example. We will do this with the help of the average formula. So, below I have some data on my worksheet.

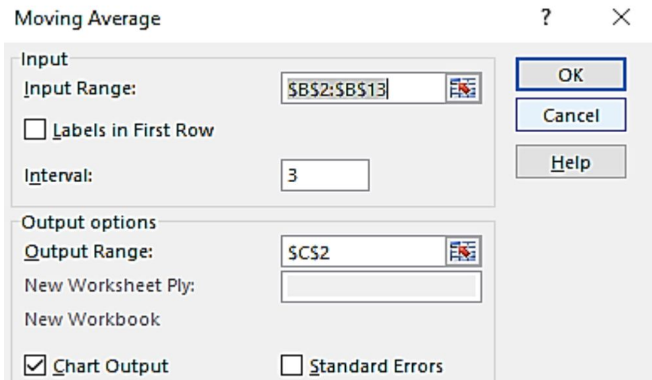


So, I click on the Data Tab and pick Data Analysis. The Data Analysis box will display. Search for Moving Average and choose it. select Ok.

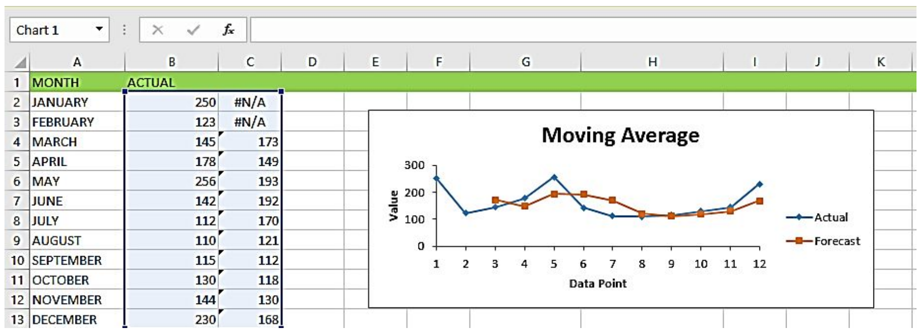


In the next box that displays, choose the sales data from B2 to B13 for the Input Range option. On the interval option, you are to put in how many months that is needed to be removed by the average.

Here, I used 3. Then, choose the output range. I chose cell C2. Choose the Chart Output. This is optional. If you want to show a chart, then pick it. choose Ok when you are done.



You will find the Moving Average chart and the output in your worksheet.



Determining Rank and Percentile

Calculating where one item ranks in relation to the other things in a group is a typical kind of data analysis. For example, you could want to see how one group's overall number of defects compares to the other groups in a data set that indicates the number of product defects by the workgroup. You may also wish to compute the percentile, which is the proportion of items in the sample that are at the same or lower level than a particular value.

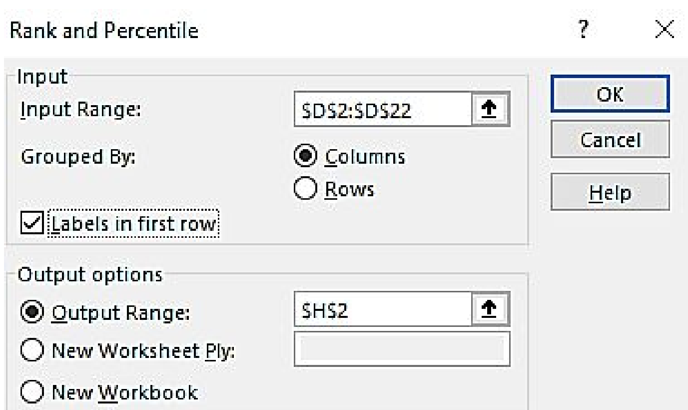
You may compute the rank using Excel's RANK.EQ and RANK.AVG functions and you can calculate the percentile using the PERCENTILE.EXC and PERCENTILE.INC functions, as I discuss in Chapter 11, "Analyzing Data with Statistics." These are fine worksheet functions, but if you don't mind utilizing static results, the Analysis ToolPak's Rank and Percentile tool can generate these numbers quickly and with less effort.

The following is how it works:

- Select Data Analysis from the drop-down menu.
- The Data Analysis dialog box appears in Excel.

- Select Rank and Percentile from the Analysis Tools section, then click OK.
- The Rank and Percentile dialog box appear in Excel.
- To define the range of cells to analyze, use the Input Range box.
- If your data is in rows, make sure the Rows radio option is selected. Select the Labels in the First Row check box if your data range contains labels (or the Labels in the First Column check box, if your data is in rows).
- Enter or click the upper-left corner of the range where you wish the results to show in the Output Range box.
- You may also choose New Worksheet Ply to dump the numbers into a new worksheet, or New Workbook to create a new file to save the information.
- The Rank and Percentile dialog box is seen in its finished state in the picture.
- Click the OK button.

As seen in the image, Excel calculates the rank and percentile values and displays them in the place you defined in Step 4. The example data in this instance is the worksheet's Defects column (D3: D:22).



Product Defects Database

Workgroup	Group Leader	Defects	Units	% Defective	Point	Defects	Rank	Percent
A	Hammond	8	969	0.8%	20	19	1	100.00%
B	Brimson	4	816	0.5%	7	15	2	94.70%
C	Reilly	14	1,625	0.9%	3	14	3	89.40%
D	Richardson	3	1,453	0.2%	9	13	4	84.20%
E	Durbin	9	767	1.2%	18	12	5	78.90%
F	O'Donoghue	10	1,024	1.0%	15	11	6	73.60%
G	Voyatzis	15	1,256	1.2%	6	10	7	63.10%
H	Granick	8	782	1.0%	19	10	7	63.10%
I	Aster	13	999	1.3%	5	9	9	52.60%
J	Shore	9	1,172	0.8%	10	9	9	52.60%
K	Fox	0	936	0.0%	1	8	11	36.80%
L	Bolter	7	1,109	0.6%	8	8	11	36.80%
M	Renaud	8	1,022	0.8%	13	8	11	36.80%
N	Ibbitson	6	812	0.7%	12	7	14	26.30%
O	Harper	11	978	1.1%	17	7	14	26.30%
P	Ferry	5	1,183	0.4%	14	6	16	21.00%
Q	Richens	7	961	0.7%	16	5	17	15.70%
R	Munson	12	690	1.7%	2	4	18	10.50%
S	Little	10	1,105	0.9%	4	3	19	5.20%
T	Jones	19	1,309	1.5%	11	0	20	0.00%

Generating Random Numbers

When you're constructing a data analysis model in Excel, it won't be worth a damn if it doesn't have any data in it so you can put it through its paces. You can add some placeholder test values by hand if you don't have any data, but it seems like a lot of effort. Fortunately, you may avoid that time-consuming task by using the Analysis ToolPak's Random Number Generation tool, which will happily produce a set of random values for your model.

True, Excel has tools for generating random integers in the spreadsheet, but these functions, although helpful, are restricted. The RAND function, for example, creates random numbers between 0 and 1, whereas the RANDBETWEEN function generates random numbers between two values. Go ahead and use either function if it meets your data needs.

RAND and RANDBETWEEN's figures, on the other hand, aren't always relevant since they aren't practical. If your data model is based on student test scores, for example, random values between 40 and 100 are unrealistic since student test scores are nearly usually distributed as a bell curve, with most of the results clustered in the center and just a few outcomes on the high and low ends.

The Random Number Generation tool allows you to produce random values using different distributions that determine the pattern of the data to assist you achieve more realistic random numbers.

Here's a basic overview:

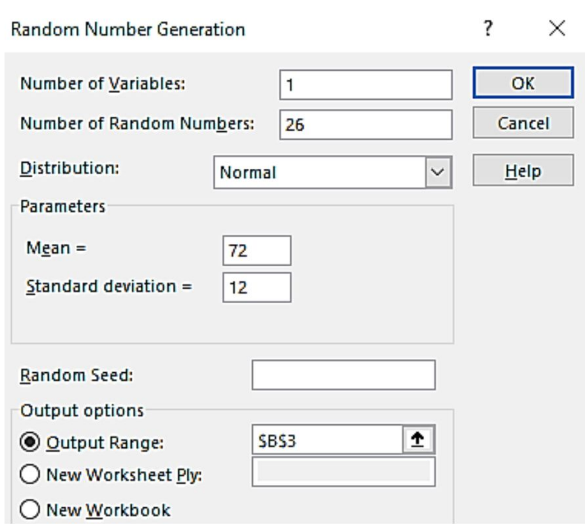
- **Uniform**: From the range of values you specify, generates numbers with an equal probability (which makes the Uniform distribution similar to the RANDBETWEEN worksheet function).
- **Normal**: Generates numbers based on a mean and standard deviation in a bell curve distribution.
- **Bernoulli**: Generates a random succession of 1s and 0s depending on the likelihood of a single trial being successful.
- **Binomial**: Generates random numbers based on the likelihood of success across a set of trials.
- **Poisson**: Produces random numbers depending on the likelihood of a certain number of events happening within a given time period.
- **Patterned**: Produces random numbers based on a pattern defined by a lower and upper limit, step value, and repetition rate.
- **Discrete**: Generates random numbers based on a set of variables and their probability.

Don't be concerned if you don't grasp all of these distributions or even how to pronounce any of them. Feel free to play about with each one to see what you come up with. The procedures for using the Random Number Generator tool are as follows:

- Select Data Analysis from the drop-down menu.
- The Data Analysis dialog box appears in Excel.
- Select Random Number Generation from the Analysis Tools box, then click OK.
- The dialog window for Random Number Generation appears.
- Choose the number of random numbers you wish to produce.
- Enter the desired number of random number sets in the Number of the Variables text box. This is the number of columns in the output that will be created.
- Enter the number of random numbers you want in each batch in the Number of Random Numbers text box. This is the number of rows in the output that will be created.

- Select the sort of distribution you wish to employ from the Distribution list.
- To define the distribution parameters, use the controls in the Parameters group.
- The choices you see are determined by the distribution you choose in Step 4. The Normal distribution is chosen in the Random Number Generation dialog box displayed in the figure, thus the parameters are a mean value and a standard deviation.
- (Optional) Enter a starting point for the random number generation in the Random Seed text box.
- You may start the production of random numbers by providing a value that Excel will utilize. The advantage of employing a Random Seed value, as Excel refers to it, is that you may use the same "seed" to generate the same collection of random numbers in the future.
- Enter or click the upper-left corner of the range where you wish the random numbers to appear in the Output Range box.
- You may also choose New Worksheet Ply to add the random numbers to a new worksheet, or New Workbook to create a new file for the output.
- Click the OK button.

As illustrated in the figure, Excel creates random numbers and then displays them in the area you defined in Step 7.



Creating a Frequency Distribution

We will do this by using the frequency function. The frequency formula is =FREQUENCY (data_array, bins_array).

- **Data array:** The frequencies are counted using a set of array values. The frequency function outputs an array of value 0 if the data array values are zero.
- **Bins array:** A collection of array values that are used to organize the input array's contents. It will yield the array items from the data sequence if the bin array values are zero. you will find this function in the formula tab.

Steps in doing this;

Here is my table here, I have a dataset that consists of twenty values.

	A	B	C	D	E	F
1	data					
2	2					
3	3					
4	3					
5	5					
6	6					
7	10					
8	12					
9	14					
10	14					
11	15					
12	16					
13	17					
14	19					
15	22					
16	23					
17	24					
18	29					
19	30					
20	32					
21	34					

So, the first thing to do is to let Excel know the upper limits for our bins in the frequency distribution. Here, I used 10, 20, and 30 i.e. 0-10, 11-20, 21-30, and 30+.

	A	B	C	D	E
1	data		bins		
2	2		10		
3	3		20		
4	3		30		
5	5				
6	6				
7	10				
8	12				
9	14				
10	14				
11	15				
12	16				
13	17				
14	19				
15	22				
16	23				
17	24				
18	29				
19	30				
20	32				
21	34				

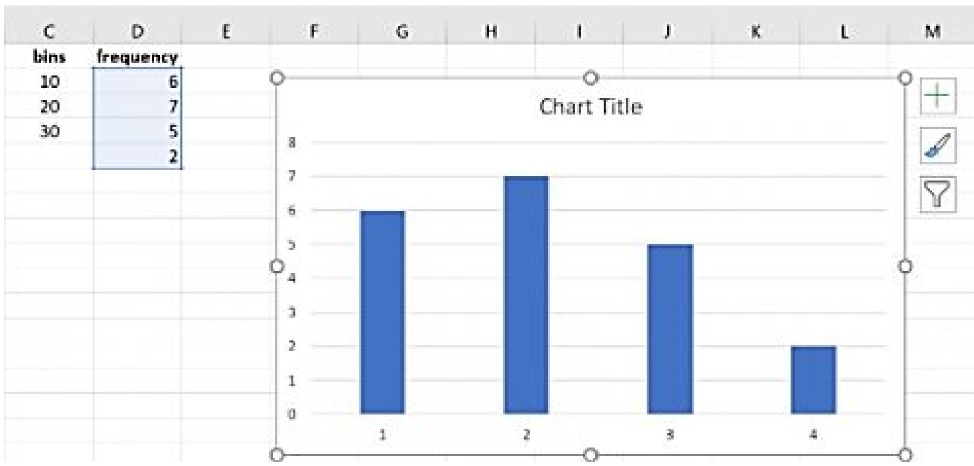
Now, to calculate the frequency of each bin, I will apply the Function formula. =Frequency (A2:A21,C2:C4).

D2 | fx =FREQUENCY(A2:A21, C2:C4)

	A	B	C	D	E	F	G
1	data		bins	frequency			
2	2		10	6			
3	3		20	7			
4	3		30	5			
5	5			2			
6	6						
7	10						
8	12						
9	14						
10	14						
11	15						
12	16						
13	17						
14	19						
15	22						
16	23						
17	24						
18	29						
19	30						
20	32						
21	34						

Only 6 values are in the range of 0-10, only 7 values are in the range of 11-20, only 5 values are in the range of 21-30, and only two values are bigger than 30. Now, with the steps below, we will visualize the distribution.

First, highlight D2:D5. Select Insert from the ribbon and click on the 2-D Column. A chart will be displayed on your worksheet which shows the frequencies for each bin.



CHAPTER THIRTEEN

ANALYZING DATA USING INFERENTIAL STATISTICS

In this chapter, I discuss the Excel Analysis ToolPak add-more in's advanced features, such as sampling, t-test, z-test, scatter plot, regression, correlation, ANOVA, and f-test. Inferential statistics are used to look at a set of sample data selected from a population and then draw conclusions — that is, make inferences — about the population's features using these other methods. (Skip back to Chapter 12 to learn about the basic descriptive statistical tools that Excel provides with the Analysis ToolPak add-in.) If you haven't previously done so, go back to Chapter 12 to discover how to install the Analysis ToolPak add-in.)

It's important to note straight away that in order to utilize these tools, you'll need a solid understanding of statistics. A solid fundamental statistics course in college or graduate school, and maybe a follow-up course, is what I'm talking about. All of these technologies may be put to good use if you have a fair understanding of statistics and a little patience.

Data Sampling

You may choose items from a data collection either randomly or frequently using the Analysis ToolPak's Sampling tool, with "regular" implying that you select every nth item. Why would you want to do anything like that? The most typical explanation is that your whole data collection (the population) is too large to analyze in a reasonable amount of time. So, instead of extracting a sample, you apply the inferential statistical methods described in this chapter on the sample to derive inferences about the population.

As an example, assume you wish to choose 20 orders at random from a table of invoices as part of an internal audit. That's an ideal job for the Sampling tool!

	L	M	N	O	P	Q	R	S	T	
1	ShippedDate	Shipper	ProductID	ProductName	UnitPrice	Quantity	Discount	ExtendedPrice	Freight	Shipi
2	1/16/2019	Federal Shipping	29	Thüringer Rostbratwurst	$99.00	21	0%	$2,079.00	$83.93	Easte
3	1/16/2019	Federal Shipping	35	Steeleye Stout	$14.40	35	0%	$504.00	$83.93	Easte
4	1/16/2019	Federal Shipping	49	Maxilaku	$16.00	30	0%	$480.00	$83.93	Easte
5	1/10/2019	Speedy Express	30	Nord-Ost Matjeshering	$20.70	18	0%	$372.60	$12.51	Rattl
6	1/10/2019	Speedy Express	56	Gnocchi di nonna Alice	$30.40	70	0%	$2,128.00	$12.51	Rattl
7	1/10/2019	Speedy Express	65	Louisiana Fiery Hot Pepper Sauce	$16.80	20	0%	$336.00	$12.51	Rattl
8	1/10/2019	Speedy Express	71	Fløtemysost	$17.20	60	0%	$1,032.00	$12.51	Rattl
9	1/10/2019	United Package	23	Tunnbröd	$7.20	60	0%	$432.00	$67.88	Ernst
10	1/10/2019	United Package	63	Vegie-spread	$35.10	65	0%	$2,281.50	$67.88	Ernst
11	1/9/2019	Federal Shipping	16	Pavlova	$13.90	21	15%	$248.11	$73.79	Ernst
12	1/9/2019	Federal Shipping	48	Chocolade	$10.20	70	15%	$606.90	$73.79	Ernst
13	1/8/2019	Speedy Express	26	Gumbär Gummibärchen	$24.90	30	5%	$709.65	$155.97	Maga
14	1/8/2019	Speedy Express	42	Singaporean Hokkien Fried Mee	$11.20	40	5%	$425.60	$155.97	Maga
15	1/8/2019	Speedy Express	49	Maxilaku	$16.00	30	5%	$456.00	$155.97	Maga
16	1/22/2019	Speedy Express	3	Aniseed Syrup	$8.00	50	0%	$400.00	$34.82	LINO-
17	1/13/2019	Speedy Express	1	Chai	$14.40	10	0%	$144.00	$108.04	Quee
18	1/13/2019	Speedy Express	21	Sir Rodney's Scones	$8.00	30	10%	$216.00	$108.04	Quee
19	1/13/2019	Speedy Express	28	Rössle Sauerkraut	$36.40	42	10%	$1,375.92	$108.04	Quee
20	1/13/2019	Speedy Express	36	Inlagd Sill	$15.20	5	10%	$68.40	$108.04	Quee
21	1/13/2019	Speedy Express	40	Boston Crab Meat	$14.70	2	10%	$26.46	$108.04	Quee
22	1/30/2019	United Package	11	Queso Cabrales	$16.80	30	0%	$504.00	$91.48	Ottili
23	1/30/2019	United Package	69	Gudbrandsdalsost	$28.80	15	0%	$432.00	$91.48	Ottili
24	1/30/2019	United Package	71	Fløtemysost	$17.20	15	0%	$258.00	$91.48	Ottili
25	1/14/2019	Speedy Express	37	Gravad lax	$20.80	10	0%	$208.00	$11.26	Folie
26	1/14/2019	Speedy Express	54	Tourtière	$5.90	6	0%	$35.40	$11.26	Folie
27	1/14/2019	Speedy Express	62	Tarte au sucre	$39.40	35	0%	$1,379.00	$11.26	Folie
28	1/14/2019	Speedy Express	14	Tofu	$18.60	12	0%	$223.20	$29.83	Océa

- Select Data Analysis from the drop-down menu.
- The dialog window for data analysis appears.
- Select Sampling from the Analysis Tools section then clicks OK.
- The Dialog Box for Sampling displays.
- Specify the range of cells from which you wish to extract your sample in the Input Range box.
- Only numeric values are allowed in the range you choose. Select the Labels check box if your data range has a label.
- Select a sampling technique.

For retrieving items from your data collection, Excel supports two sampling methods:

Periodic: Extracts the data set's every nth item, such as every fifth or tenth item. Select the Periodic radio button and then type the period you wish to use in the Period text box to utilize this approach.

Random: Takes elements from the data collection at random. Select the Random radio button and then enter the number of items you wish to extract in the Number of the Samples text box to utilize this approach.

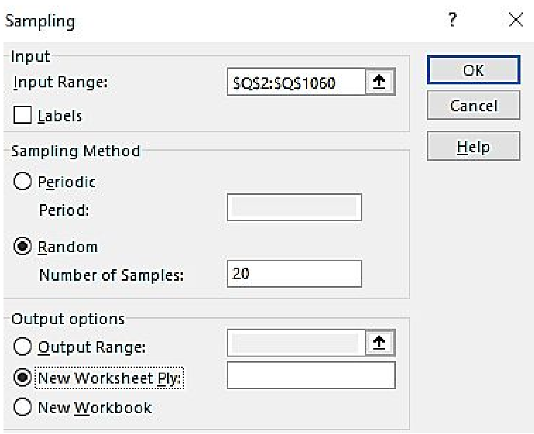
Select the Output Range radio button and type or click the upper-left corner of the output range to pick a place for the output data.

Alternatively, you may choose New Worksheet Ply to insert the sample into a new worksheet, or New Workbook to save the results to a new file.

The picture depicts the Sampling dialog box in its finished state. In this scenario, I want a random sample of 20 items from the Quantity column in the Invoices database, which is Q2:Q1060.

Click the OK button.

The sample is extracted and displayed in the place you chose in Step 5. An example may be seen in the picture. The example data in this instance is the table's Defects column (D3:D22).



Using t-Testing Tools

When you wish to draw conclusions about relatively tiny data sets, the Excel Analysis ToolPak add-in includes three tools for dealing **with t-values and t-tests:**

- paired t-test Means are calculated using two samples.
- Two-Sample t-Test Assuming Equal Variances
- Two-Sample t-Test Assuming Unequal Variances

Here's how these three tools function in a nutshell. Assume you're dealing with the values displayed in the figure for the purpose of example. The first set of values may be found in the worksheet range A1:A21. The second set of numbers may be found in the worksheet range B1:B21.

Follow these procedures to do a t-test calculation:

	A	B
1	Sample 1	Sample 2
2	0.390639	0.597253
3	0.960314	0.247645
4	0.002978	0.76919
5	0.073425	0.83317
6	0.311795	0.450877
7	0.451693	0.08733
8	0.989853	0.247164
9	0.946743	0.036413
10	0.88257	0.591507
11	0.846565	0.475535
12	0.817594	0.06112
13	0.933039	0.703724
14	0.013688	0.003346
15	0.08753	0.887344
16	0.017276	0.11998
17	0.642356	0.393307
18	0.782696	0.070239
19	0.391383	0.837355
20	0.142597	0.707126
21	0.241643	0.757264

- Select Data Analysis from the drop-down menu.
- The dialog window for data analysis appears.
- Select the t-test tool you wish to use from the Analysis Tools list, then click OK.

Paired Two-Sample t-Test for Means: When you need to do a paired two-sample t-test, use this tool.

Two-Sample t-Test Assuming Equal Variances: When you need to do a two-sample test and have reason to believe that the variances of both samples are equal, use this tool.

Two-Sample t-Test Assuming Unequal Variances: When you need to do a two-sample test but know that the two-sample variances are uneven, use this tool.

The matching t-test dialog box appears in Excel. The t-Test: Two-Sample Assuming Equal Variances dialog box is shown in the picture. The other t-test dialog windows have a similar appearance.

Identify the sample values in the Variable 1 Range and Variable 2 Range input text fields by informing Excel which worksheet ranges you've saved the two samples in.

These text fields allow you to input a range of addresses. Alternatively, you may click in the text box and then drag to pick a range. Select the Labels check box if the first cell in the variable range has a label and you want to incorporate the label in your range selection.

Indicate whether you believe the means are equal in the Hypothesized Mean Difference text box.

If you believe the samples' means are equal, write 0 (zero) or leave the text field blank. Enter the mean difference if you believe the means are not equal.

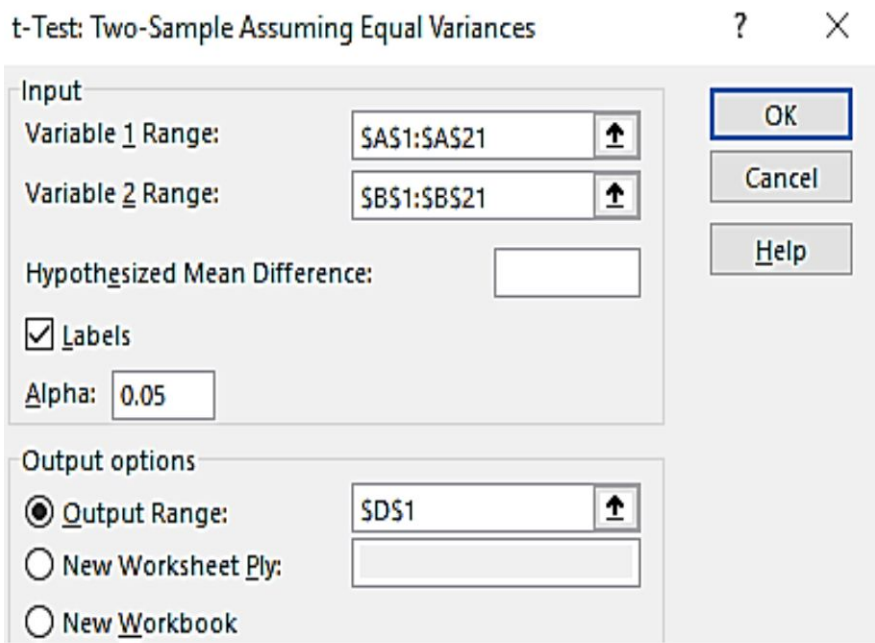
Put the confidence level for your t-test calculation in the Alpha text box.

The degree of confidence ranges from 0 to 1. The confidence level is set to 0.05 by default, which is comparable to a 5-percent confidence level.

Indicate where the t-test tool results should be saved in the Output Options section.

Select one of the radio options and type information into the text fields to tell Excel where the t-test analysis results should go. Select the Output Range radio option, then enter the range address in the Output Range text box to insert the t-test results into an existing worksheet range. Select one of the other alternative radio buttons if you wish to put the t-test findings somewhere else.

Click the OK button.



	A	B	C	D	E	F
1	Sample 1	Sample 2		z-Test: Two Sample for Means		
2	0.390639	0.597253				
3	0.960314	0.247645			*Sample 1*	*Sample 2*
4	0.002978	0.76919		Mean	0.496319	0.443844
5	0.073425	0.83317		Known Variance	0.138465	0.097277
6	0.311795	0.450877		Observations	20	20
7	0.451693	0.08733		Hypothesized Mean Difference	0	
8	0.989853	0.247164		z	0.48333	
9	0.946743	0.036413		P(Z<=z) one-tail	0.314431	
10	0.88257	0.591507		z Critical one-tail	1.644854	
11	0.846565	0.475535		P(Z<=z) two-tail	0.628861	
12	0.817594	0.06112		z Critical two-tail	1.959964	
13	0.933039	0.703724				
14	0.013688	0.003346				
15	0.08753	0.887344				
16	0.017276	0.11998				
17	0.642356	0.393307				
18	0.782696	0.070239				
19	0.391383	0.837355				
20	0.142597	0.707126				
21	0.241643	0.757264				

Determining the Regression

I discuss adding trend lines to scatter charts in Chapter 10, "Tracking Trends and Making Forecasts," to help you see the overall trend of your data. By utilizing the Analysis ToolPak's Regression tool, you may go beyond the visual regression analysis provided by the scatter plot approach. Let's imagine you started looking at a basic data set using the scatter charting approach I described before. And, following that first inspection, say you want to dig further into the data by utilizing full-fledged, no-holds-barred regression.

To use the Regression tool to do regression analysis, follow these steps:

- Select **Data Analysis** from the drop-down menu.
- The dialog window for data analysis appears.
- Choose the **Regression tool** from the Analysis Tools section, then click **OK**.
- The Regression dialog box appears in Excel.
- Find out what your Y and X values are.

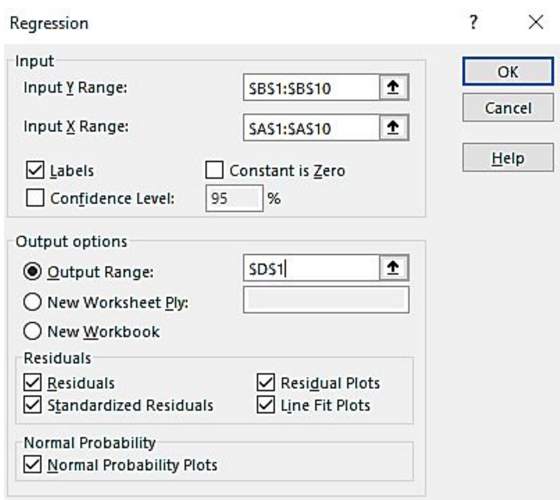
Specify the worksheet range containing your dependent variables using the Input Y Range text box. Then, using the Input X Range text box, find the worksheet range reference where your independent variables are stored.

Choose a place where the regression analysis findings will be saved.

Use the Output Options radio buttons and text boxes to tell Excel where to save the regression analysis findings. Select the Output Range radio button and then enter the range address in the Output Range text box to insert the regression results into a range in an existing worksheet, for example. Select one of the other alternative radio boxes to put the regression findings somewhere else.

- Determine what information you want to be returned.
- To define the residual findings, you want to be returned as part of the regression analysis, use the Residuals checkboxes.
- To add residuals and normal probability information to the regression analysis results, use the Normal Probability Plots check box.
- The picture depicts the dialog box in its finished state.
- Click the OK button.

The graphic displays three stacked visual plots of data from the regression analysis, as well as a part of the regression analysis findings. The R-square value, the standard error, and the number of observations are all part of a range that provides some fundamental regression statistics. The Regression tool provides analysis of variance (or ANOVA) data below that, including information on degrees of freedom, sum-of-squares value, mean square value, f-value, and F significance. The Regression tool, which appears beneath the ANOVA information, provides information about the regression line calculated from the data, including the coefficient, standard error, t-stat, and probability values for the intercept — as well as the same information for the independent variable, which in this example is the number of ads. Excel also uses basic scatter charts to depict some of the regression results. Excel plots residuals, predicted dependent values, and probabilities in the image, for example.



Correlation Calculation

The Correlation analysis tool (also included in the Analysis ToolPak) calculates the relationship between two sets of data. This tool could be used to investigate the impact of advertising on sales, for example. **Follow these steps to utilize the Correlation Analysis tool:**

- Select Data Analysis from the drop-down menu.
- The dialog window for data analysis appears.
- Select the Correlation tool from the Analysis Tools list, then click OK.
- The Correlation dialog box appears in Excel.
- Determine the range of X and Y values you want to look at.
- Use the Input Range box to find the worksheet range where your data is stored.

Excel believes that your data is in columns, so it automatically picks the Columns radio option in the Grouped By section. Select the Rows radio choice instead if your data is in rows. Select the Labels in First Row (or Labels in First Column) check box if the input range contains labels in the first row (or first column).

Choose a destination for the output.

Use the Output Options radio buttons and text boxes to tell Excel where the correlation analysis findings should go. Select the Output Range radio option and then type the range address in the Output Range text box to insert the correlation results into an existing worksheet range. Select one of the other radio buttons if you wish to save the correlation findings somewhere else.

Click the OK button.

Excel calculates the correlation coefficient for the data you entered and saves it in the location you chose. This graph depicts the link between list price and units sold. Cell E3 contains the key value. The value –0.96666 indicates that list price and units sold have a strong negative correlation. That is, when the list price rises, the number of units sold decreases.

Calculating the Covariance

The Covariance tool, which is also part of the Analysis ToolPak add-in, measures the connection between two sets of data. The average of the product of value deviations from the data set means is calculated using the Covariance tool.

Follow these instructions to utilize this tool:

- Select Data Analysis from the drop-down menu.
- The dialog window for data analysis appears.
- Select the Covariance tool from the Analysis Tools list, then click OK.
- The Covariance dialog box appears in Excel.
- Determine the range of X and Y values you wish to look at.

- Use the Input Range box to find the worksheet range where your data is stored.

Because Excel believes your data is in columns, the Columns radio option in the Grouped By section is automatically selected. Select the Rows radio choice instead if your data is in rows. Select the Labels in First Row (or Labels in First Column) check box if the input range contains labels in the first row (or first column).

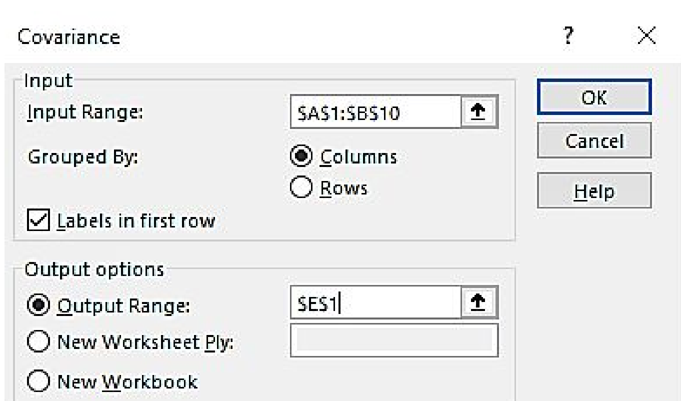
Choose a destination for the output.

Use the Output Options radio buttons and text boxes to tell Excel where the covariance analysis findings should go. Select the Output Range radio option and then type the range address in the Output Range text box to insert the results into an existing worksheet range. Select one of the other Output Options radio buttons if you wish to save the results somewhere else.

The picture depicts the dialog box in its finished state.

After you've chosen your export settings, click **OK**.

Excel generates the covariance information for the data you selected and saves it in the location you chose. The correlation findings for the list price and units sold data are shown in the image.



Using Anova Tools

ANOVA: Single Factor, **Anova:** Two-Factor With Replication, and **Anova:** Two-Factor Without Replication are three Anova (analysis of variance) tools included in the Analysis ToolPak add-in. You may compare sets of data using the Anova tools by looking at the variation of values in each set.

The following are the steps to using an Anova tool:

- Select Data Analysis from the drop-down menu.
- The dialog window for data analysis appears.
- Select the Anova tool you wish to use from the Analysis Tools list, then click OK.
- The corresponding ANOVA dialog box appears in Excel.
- Describe the information that will be analyzed.
- Use the Input Range box to find the worksheet range where your data is stored.

Because Excel believes your data is in columns, the Columns radio option in the Grouped By section is automatically selected. Select the Rows radio choice instead if your data is in rows. Select the Labels in First Row (or Labels in First Column) check box if the input range contains labels in the first row (or first column).

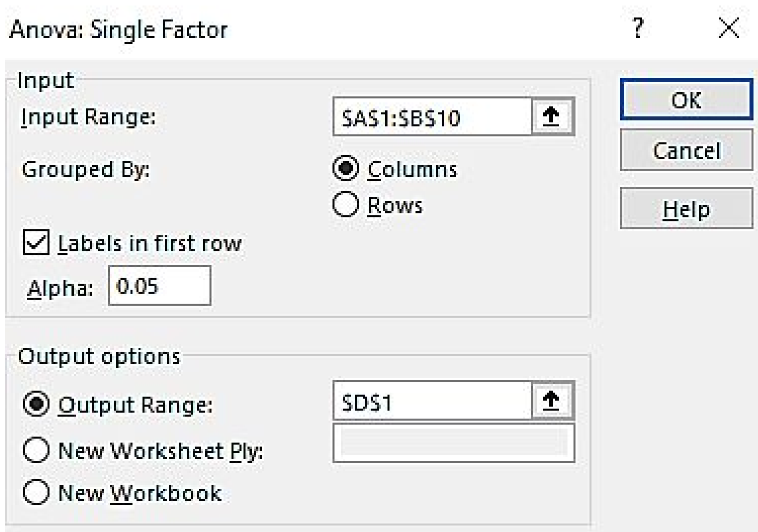
Describe where the Anova results will be stored.

Use the Output Options buttons and boxes to tell Excel where the Anova analysis findings should go. Select the Output Range radio option and then enter the range address in the Output Range text box if you wish to insert the Anova results into a range in an existing spreadsheet, for example. Select one of the other Output Options radio buttons to place the Anova findings somewhere else.

The picture depicts the Anova: Single Factor dialog box in its finished state.

Click the OK button.

The Anova calculation results are returned by Excel.



Performing an f-test

An f-test is a test that is used to determine whether or not something is true. A tool for calculating two-sample f-test calculations is included in the Excel Analysis ToolPak add-in. You can compare variances between two populations using an f-test analysis.

The following are the steps to using the f-test tool:

- Select Data Analysis from the drop-down menu.
- The dialog window for data analysis appears.
- Select the F-Test Two-Sample for Variances tool from the Analysis Tools list, then click OK.
- The F-Test Two-Sample for Variances dialog box appears in Excel.
- Identify the sample values in the Variable 1 Range and Variable 2 Range input text fields by informing Excel which worksheet ranges you've saved the two samples in.

These text fields allow you to input a range of addresses. Alternatively, you may click in the text box and then drag to pick a range. Select the Labels check box if the first cell in the variable range has a label and you want to incorporate the label in your range selection.

Put the confidence level for your t-test calculation in the Alpha text box.

The degree of confidence ranges from 0 to 1. The confidence level is set to 0.05 by default, which is comparable to a 5-percent confidence level.

Describe where the f-test results will be stored.

Use the Output Options buttons and boxes to tell Excel where the f-test analysis findings should go. Select the Output Range radio button and then enter the range address in the Output Range text box, for example, if you wish to insert the results into a range in an existing worksheet. Select one of the other Output Options radio buttons to save the results somewhere else.

The image depicts the F-Test Two-Sample for Variances dialog box in its completed state.

Click the OK button.

The results of the f-test computation are returned by Excel.

CHAPTER FOURTEEN

TEN THINGS YOU OUGHT TO KNOW ABOUT STATISTICS

Counting, averaging, adding, and standard deviation the data are all part of the "analysis" aspect of "data analysis." In a nutshell, statistics play a big role in data analysis. However, here's the problem with statistics: It's a topic that quickly becomes difficult once you get beyond the fundamentals. Fortunately, you can jump over many of these early statistics stumbling blocks like a gazelle by understanding a few fundamentals, which is what this chapter is all about.

When I say "basics," I mean just that. There will be no discussion of statistical jargon like chi-squared distributions or Fourier analysis in the paragraphs that follow. This chapter has no Greek letters.

If you've never been exposed to statistics in school or it's been a decade or two since you were, you'll find some important background information here to help you utilize some of Excel's statistical capabilities.

Descriptive statistics are simple to understand.

The first thing you should know about statistics is that certain statistical analyses and statistical measurements are rather simple. Even for someone who isn't very quantitative, descriptive statistics, which include things like pivot table cross-tabulations (covered in Chapters 7–9) and basic statistical functions, make sense. When you add up a series of numbers, you obtain a total. Isn't that simple? Finding the largest or lowest value in a group of numbers is also rather basic.

This argument regarding descriptive statistics is important since many individuals become nervous when they hear the term statistics. That's a shame since descriptive statistics is among the most valuable statistical tools you have at your disposal.

Deviation from the mean Explains the concept of dispersion.

If you've ever taken a statistics class, you may recall this oddity. When someone says "average," she typically means the most frequent average measurement, which is the mean. However, you should be aware that there are numerous other widely recognized average measures, such as mode, median, and other special mean measurements, such as the geometric mean and harmonic mean.

I'd want to briefly go through a few of them... Not because you need to know everything, but because knowing that the word average is inaccurate helps you appreciate some of the book's talks and much of Excel's statistical features.

Assume you're looking at a limited collection of numbers: 1, 2, 3, 4, 5, to make this topic more specific. The mean of this tiny group of numbers is 3, which you can get by adding all of the numbers in the set (1+2+3+4+5) and then dividing the total (15) by the total number of values in the set (5).

The mode and median are two more frequent average metrics. I'll start with the median measurement since it's easy to understand given the data set I introduced in the previous paragraph. In the sense that there are as many values bigger than the median as there are values less than the median, the median is the halfway value. The median is the data set 1, 2, 3, 4, 5 is 3. Why? Because there are two bigger values (4 and 5) and two lower values in this data set (1 and 2).

When your data collection has an even number of values, the median is calculated by averaging the two middle values. The data sets 1, 2, 3, and 4 have no middle value, for example. Divide by 2 after adding the two middle numbers (2 and 3). The median number obtained from this computation is 2.5. Half of the data set's values are above the median value of 2.5, while half of the data set's values are below the median value of 2.5.

A third common average is used to calculate the mode. The most frequent value in the data set is the mode. Consider the following data set: 1, 2, 2, 2, 3, 5, 5. The numbers 1 and 3 appear just once, whereas 5 appears twice and 2 appears three times. As a result, the most frequent value is 2, and the data set's mode is 2.

Other popular statistical metrics of the average exist, as I mentioned previously. Because the numbers in the data set are joined together arithmetically as part of the calculation, the mean measurement I mentioned previously in this article is really arithmetic mean. However, you may mix and match the values in numerous ways. A geometric mean, for example, is sometimes used by financial analysts and scientists. There's also a concept known as a harmonic mean.

You don't need to know (much less comprehend) these additional average metrics, but keep in mind that since there are so many different methods to compute an average, just using the word average is inaccurate. Make sure everyone understands what kind of average you're utilizing. What if someone else uses the word average without indicating the sort of average? That individual is most likely talking about the mean, but you can't be sure, and uncertainty is harmful when it comes to statistics.

Standard Deviations Describe Dispersion

In most statistical reports, the standard deviation or its near sibling, the variance, is mentioned in some ambiguous or frightening way. Although the standard deviation formula is intimidating to look at — at least if you're not familiar with the Greek letters — the formula and rationale are intuitively simple to grasp.

The standard deviation describes the dispersion of values in a data collection around the mean. In general, a low standard deviation indicates that the values are grouped around the mean; a large standard deviation indicates that the values are spread out away from the mean.

For example, later in this chapter, I discuss the normal distribution, which is a set of items in a data set that, when plotted, produces the classic bell curve: low at the start for the smallest values, curving up to a peak at the mean value, curving down from the mean, and then low again for the largest values. That's all a little hazy, but standard deviation may help you become a lot more specific. That's because the standard deviation reveals something about how the items in the normal distribution are clustered:

The data set has 68 percent of values that are within one standard deviation of the mean. If the mean is 50 and the standard deviation is 10, then 68 percent of the values are in the range of 40 to 60.

The data set's 95 percent of the values are within two standard deviations of the mean. 95 percent of the results with a mean of 50 and a standard deviation of 10 are between 30 and 70.

The data set contains 99.7% of values that are within three standard deviations of the mean. With a mean of 50 and a standard deviation of 10, 99.7% of the values fall between 20 and 80 percent of the time.

An Observation is an Observation

If you read anything about statistics in this book or in the Excel online Help, you'll come across the phrase observation. An observation is nothing more than that. Please bear with me if this seems cyclical. Assume you're putting together a data collection of daily high temperatures in your area. When you step outside and see that the temperature is 87° F on a beautiful July day, that is your first observation. The second observation is when you step outside and see that the high temperature the following day is 88° F.

Another way to define observation is as follows: You make an observation whenever you give a value to one of your random variables. When you walk out and give a new temperature value (87° one day, 88° the next, and so on) to a data collection of daily high temperatures in your area, for example, you're producing an observation.

A Sample is a Subset of Values

A sample is a subset of a population's observations. Your little collection of observations, for example, is a sample if you establish a data set that records the daily high temperature in your area.

A sample, on the other hand, is not the same as a population. All available observations are included in a population. When collecting daily high temperatures in your area, the population includes all daily high temperatures from the community's inception.

Inferential Statistics Are Interesting, but They're Also Complicated

Some numbers, as I said previously in this chapter, are simple to comprehend. Calculating the biggest value in a collection of integers, for example, is unmistakably a statistical measurement, but there's no mystery involved. Descriptive statistics, for example, determine the greatest value in a data set, and for the most part, we mere mathematical mortals can grasp such statistics.

The same cannot be stated for inferential statistics, the second major discipline of statistics. Inferential statistics are based on a highly valuable concept that isn't immediately apparent. You may make inferences about the whole population based on the features of a sample of values from a population if the sample is representative and big enough.

For example, in every presidential election in the United States, the main television networks predict the victor when just a tiny number of votes have been tallied or counted (typically counter to their prior assurances). What are their methods for doing this? They do, after all, take a sample of the population. They specifically stand outside polling stations and inquire about how individuals voted. You may deduce how all the voters voted if you ask a significant sample of voters whether they voted for one candidate or the other. After that, you can forecast who will win the election.

Although incredibly effective, inferential statistics have two characteristics that I want to highlight:

Issues with accuracy: When making a statistical inference, you may never be completely certain that your conclusion is true. It's always possible that your sample isn't representative or that the accuracy of your sample isn't high enough to estimate the population value.

This is largely what transpired in the United States during the presidential election of 2000. On the basis of exit surveys, several of the major news networks projected that Al Gore would win. They then anticipated that George W. Bush would win based on previous exit surveys. They then ceased forecasting the race, either understanding that their statistics weren't good enough given the closeness of the race, or just because of their personal shame at bobbling the ball. In hindsight, their difficulty in predicting the contest was unsurprising given the razor-thin margin of victory between the two contenders.

A steep learning curve: Inferential statistics may get rather sophisticated very rapidly. When working with inferential statistics, you'll come across phrases like probability distribution functions, insane (in some circumstances) parameters, and a lot of Greek symbols right away.

In practice, if you haven't taken at least one statistics class — and most likely more than one statistics class — it will be difficult to move into inferential statistics in a significant way. With a single statistics class and possibly the information in this book, you should be able to work with inferential statistics based on normal and uniform distributions. Working with inferential statistics and applying them to different probability distributions, on the other hand, maybe difficult. At least, that's what I've noticed.

Probability Distributions aren't always difficult to understand.

A probability distribution is one of the statistical concepts you'll come across a few times in this book — and a lot more if you go into the Excel Help file. This sentence seems to be difficult, and in some circumstances, it is. With a few good examples, you can genuinely comprehend what a probability distribution is.

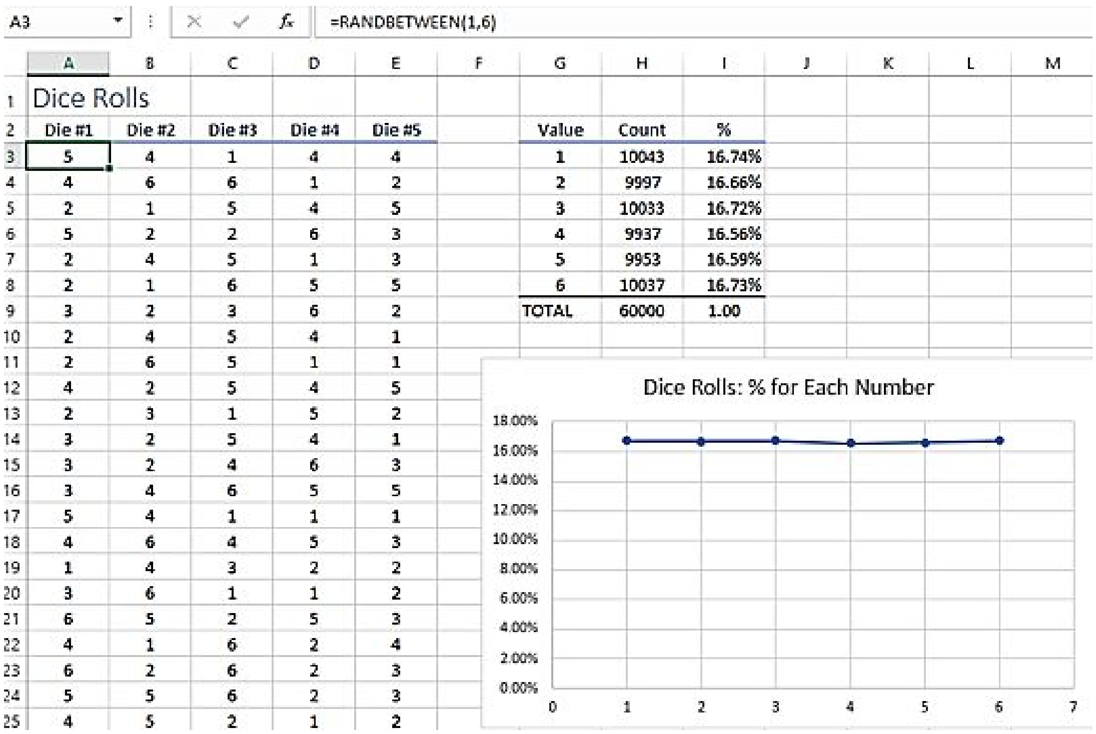
A T distribution is a popular distribution that you may have heard about in statistics lectures. A T distribution is similar to a normal distribution, except that the tails are longer and fatter. There are also skewed distributions (those with the hump inclined in one direction or the other). The probability distribution function for each of these probability distributions, on the other hand, specifies the probability distribution chart.

I'll look at two probability distributions in the following two sections: uniform distribution and normal distribution.

Uniform Distribution

A uniform distribution is a common probability distribution function. Every event has the same chance of occurring in a uniform distribution. As an example, imagine you're rolling a six-sided die. If the die is fair, you have an equal chance of rolling one of the following numbers: 1, 2, 3, 4, 5, or 6. Given the enormous amount of observations, you might anticipate rolling a 1 roughly 10,000 times if you roll the dice 60,000 times. Similarly, you'll very certainly roll a 2, 3, 4, 5, or 6 10,000 times. Sure, there will be some variation between what you anticipate (10,000 occurrences of each side of the six-sided die) and what you get. Your actual observations, on the other hand, would closely match your assumptions.

The thing that makes this distribution stand out is that everything is rather level. The probability or likelihood of rolling any of the six sides of the die is even, or uniform. This is where the term "uniform distribution" comes from. Every event has the same chance of happening. I constructed a uniform distribution by simulating 60,000 dice rolls, as seen in the figure. (Can you tell me how I made those rolls? By first inserting the formula =RANDBETWEEN(1,6) and then copying and pasting it into 60,000 cells.) The uniform distribution is simply a horizontal line, as you can see.



A3 =RANDBETWEEN(1,6)

Dice Rolls

Die #1	Die #2	Die #3	Die #4	Die #5
5	4	1	4	4
4	6	6	1	2
2	1	5	4	5
5	2	2	6	3
2	4	5	1	3
2	1	6	5	5
3	2	3	6	2
2	4	5	4	1
2	6	5	1	1
4	2	5	4	5
2	3	1	5	2
3	2	5	4	1
3	2	4	6	3
3	4	6	5	5
5	4	1	1	1
4	6	4	5	3
1	4	3	2	2
3	6	1	1	2
6	5	2	5	3
4	1	6	2	4
6	2	6	2	3
5	5	6	2	3
4	5	2	1	2

Value	Count	%
1	10043	16.74%
2	9997	16.66%
3	10033	16.72%
4	9937	16.56%
5	9953	16.59%
6	10037	16.73%
TOTAL	60000	1.00

Normal Distribution

The normal distribution, often known as a bell curve or a Gaussian distribution, is another frequent kind of probability distribution.

In many instances, a normal distribution happens spontaneously. Intelligence quotients (IQs), for example, are normally distributed. A normal distribution is created by taking a large group of individuals, testing their IQs, and then plotting their IQs on a graph. The fact that the majority of the population's values are centered around the mean is one of the characteristics of a normal distribution. Another feature of a normal distribution is that the mean, mode, and median all have the same value.

A probability distribution function is nothing more than a function, or equation, that describes the distribution's line. Not every probability distribution resembles a normal or uniform distribution, as you would expect.

Parameters aren't as complicated as they seem.

You're ready to comprehend that a parameter is an input to the probability distribution after you realize that a probability distribution is simply an equation or formula that represents the line in a probability distribution chart. To put it another way, the formula, function, or equation that represents a probability distribution curve requires inputs, which are known as parameters.

Only one parameter is required for certain probability distribution functions. For example, all you truly need to work with a uniform distribution is the number of values in the data collection. There are only six choices on six-sided dice, for example. You can calculate that every option has a 1 in 6 probability of occurring since you know there are only six choices. The mean and standard deviation are the two parameters that make up a normal distribution. Other parameters are used in other probability distribution functions.

Skewness and Kurtosis Describing a Probability

Skewness and Kurtosis are terms used to describe the skewness and kurtosis of a probability distribution. Skewness and kurtosis are two further statistical words to be familiar with. Skewness is a measure of a probability distribution's lack of symmetry. The skewness of a completely symmetrical distribution, such as the normal distribution, is zero. However, if a probability distribution leans to the right or left, the skewness equals a number other than zero, and the number represents the absence of symmetry.

The heaviness of the tails in distribution is measured by kurtosis. Kurtosis equals 0 in a normal distribution. To put it another way, zero is the measurement for a tail that resembles a normal distribution tail. The thing that stretches out to the left or right is the tail. The kurtosis is a positive value if a tail in distribution is heavier than in a normal distribution. The kurtosis of a distribution is a negative value if the tails are thinner than in a normal distribution.

Confidence Intervals May Appear Difficult at First, but They Are Beneficial.

People are often perplexed by probabilities, and this is likely most evident during presidential elections in the United States. Pundits speak about a candidate's prospects of winning in a variety of misleading ways (often in ways confusing to even the pundits themselves).

"According to the findings of a recent survey, candidate Stem Winder would earn 51 percent of the vote if the election were conducted today; the margin of error was +/- 3 percent with a confidence level of 95 percent," claims some TV pundit.

Okay, that was a lot, but if you break it down, things get a bit clearer. The survey's true meaning is as follows: The pollsters questioned a random sample of the US public who they would vote for today, and 51 percent of the people answered they would vote for Mr. Winder.

This is when things start to get interesting. Because of the sample size, pollsters can perform some clever arithmetic and deduce that the true proportion of persons who would vote "Winder" in the overall population is between 48 and 54 percent (more on this later). It's worth noting that "margin of error" is essentially the same thing as "confidence interval."

It's crucial to understand the relationship between confidence levels and the margin of error. The margin of error calculated by the pollsters in the preceding example would be larger if they wanted a range of values with a confidence level of 99 percent.

To put it another way, there's a 95 percent chance (sort of) that the real percentage of people who would vote "Winder" in the entire population is between 48 and 54 percent, but a 99 percent chance (again, sort of) that the real percentage is between 45 and 57 percent. The greater the range of probable values, the more certain you may be that the actual data point will fall inside it. The greater your range, on the other hand, the surer you want to be that the true data point is contained in it.

This is why one of my pet peeves is that when news organizations report on polls, they often just mention the margin of error and not the confidence level. The information on the margin of error is rather pointless without knowing the confidence level that the pollster used to compute it.

Another key point to remember regarding confidence levels is that for the same confidence level, the larger your sample size, the narrower your margin of error will be. If you poll two individuals on the street and ask them who they expect to vote for, and one answers "the challenger" and the other says "the incumbent," you can't declare with certainty that the nation will vote in a 50-50 split. Unless you select a very low confidence level for your computations, data from this sample would have a huge margin of error.

If you take a random sample of 5,000 individuals and ask them who they're voting for, you'll have some fairly strong footing to stand on when predicting who will win the presidential election. To put it another way, a sample of 5,000 individuals has a lot lower margin of error than a sample of two, assuming you desire the same degree of confidence for both samples.

Making a minor adjustment at a point: Although it was simpler to use as an explanation when initially introducing the fundamental notion of a confidence interval, I wasn't exactly right when I claimed that the confidence interval meant that there is a 95% probability that the true value falls inside this range. Technically, a confidence interval with 95 percent confidence means that if you took different samples from the same population over and over again, and then calculated the confidence interval for those samples in the exact same way for each new sample, the confidence intervals you calculated from the samples would include the real number about 95 percent of the time (because your data from each sample will be slightly different each time, and therefore the interval you calculate will be slightly different as well). So when I say "95 percent chance" or "99 percent chance," I mean exactly what I say. (I need to offer this explanation so that if my old statistics instructors read this book, they don't shake their heads in shame.)

My last argument is that using confidence intervals for election prediction is far from the only thing you can do with them.

Considering the following scenario: you have Google Analytics data on two separate online advertising you're running to market your small company, and you want to know which one is more successful. You may use the confidence interval calculation to determine how long your advertisements should run until Google has gathered enough data to determine which ad is really superior. (In other words, the formula determines the sample size required to overcome the margin of error.)

CHAPTER FIFTEEN

TEN WAYS TO ANALYZE FINANCIAL DATA

Scientists, engineers, mathematicians, statisticians, and pollsters are among those who utilize Excel. However, if you could poll all of the world's Excel users, I'm sure the majority of them work in the financial business. Financial types depend on Excel every day to examine budgets, loans, investments, and other monetary details, whether they're accountants or adjusters, bankers or borrowers, money managers or money lenders.

Excel is used by more than just financial professionals (sometimes literally). Excel may also be used to assess mortgages, auto payments, education funds, savings accounts, and other day-to-day finances by financial novices.

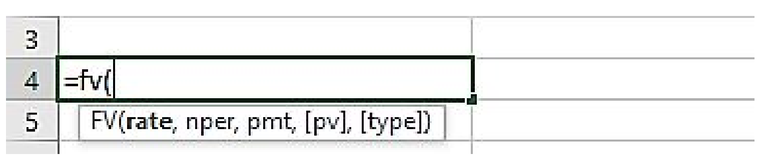
Whether you work for money or for money, this chapter will teach you 10 helpful Excel strategies for evaluating financial data.

Calculating Future Value

Excel has lots of financial functions. People use these functions to calculate their day-to-day activities in their company or firm. Some of the functions are Future Value (FV), FVSCHEDULE, Present Value (PV), XNPV, PPMT, and lots more. Below are some of the ways you can utilize these functions in Excel.

The Function Value (FV) is used to discover the future value of an investment. It contains the interest rate that doesn't change and the payment made periodically.

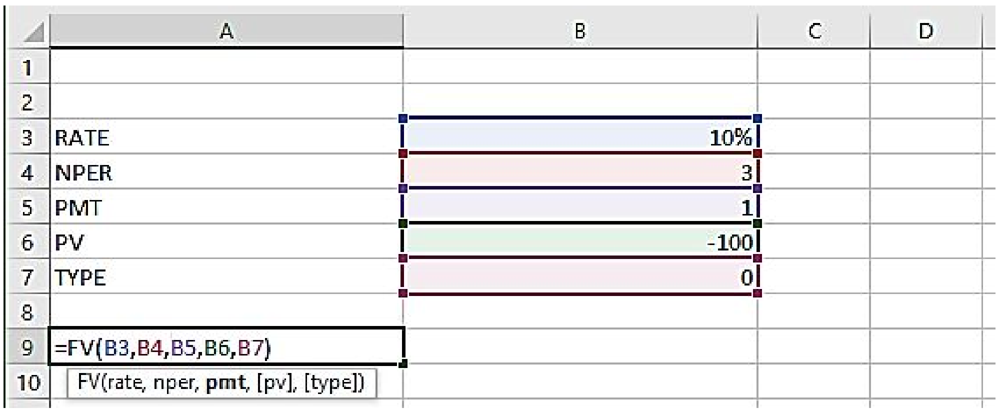
To do this, the formula below is used;



Rate here means the interest rate or the period. **Nper** means the number of periods.

[Pmt] means the payment period. **PV** means the Present Value. [**Type**] means when the payment is made. In this [type] option, when something is attached to it, it means that the payment was made at the period end.

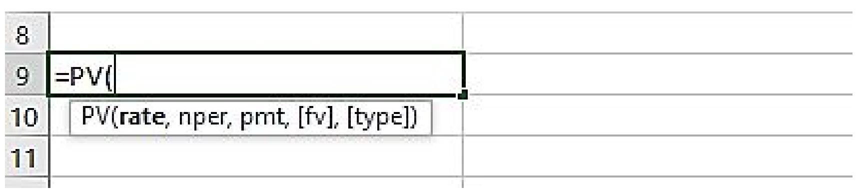
Example: Apple invested the US $100 in 2017 and this payment has been made yearly. They have an interest of 10% per annum. What would be their future value in 2021?



You will get the US $129.79

Calculating Present Value

This is done using the Present Value function. It is easier to calculate the present value if you can calculate the future value.



Example: The FV of investment in Canada is $100 in 2017. They make the payment yearly with an interest rate of 10% per annum. Calculate the present value?

	A	B	C	D
1				
2				
3	RATE	10%		
4	NPER	3		
5	PMT	1		
6	FV	-100		
7	TYPE	0		
8				
9	=PV(B3,B4,B5,B6,B7			
10	PV(rate, nper, pmt, [fv], [type])			

You will have $72.64

Calculating the positive and negative cash flows

This is done using the Net Present Value (NPV). It is the total sum of the positive and negative cash flows over years.

10		
11	=NPV(	
12	NPV(rate, value1, [value2], ...)	

Rate means the discount rate for some time. The Values mean the positive or negative cash flows. Negative values are seen as payments while positive values are seen as inflows.

Example:

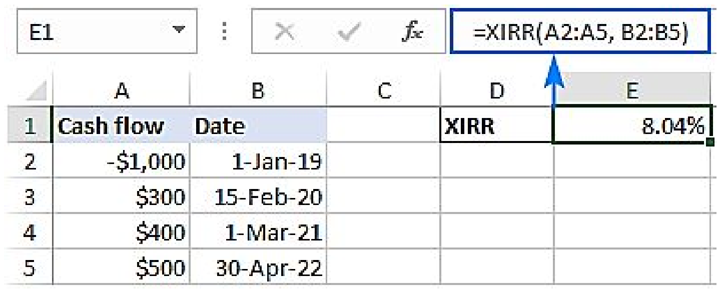
	A	B	C	D	E
1					
2		Details	In US $		
3		Rate of Discount	5%		
4		Initial Investment	-1000		
5		Return from 1st year	300		
6		Return from 2nd year	400		
7		Return from 3rd year	400		
8		Return from 4th year	300		
9					
10		=NPV(C3,C5:C8)+C4			

You will get $240.87.

Calculating non-periodic future cash flows

This is done with the XIRR function. The syntax for this formula is XIRR (values, dates, [guess]). Values here mean the range of cells or arrays that represent a series of income and expenditures. Dates mean the dates for the cash flows. It can be in any order. The date of the first investment has to come first. Guess means the expected IRR is given as a percentage or a decimal.

For example;



Things to note down when using these functions

- The Excel formula XIRR is used to calculate the internal rate of return for cash flows with mismatched scheduling. The IRR function may be used to model periodic cash flows with unpredictable payment dates.
- At most 1 good (income) and 1 bad (extrovert expenditure) value must be present in the range of outcomes.
- The initial value must be expressed by a negative integer if it is an expenditure (initial investment). The original investment is not amortized; future payments are rolled back to the first cash flow date and marked down on a 365-day basis.
- The proportional component of a date that reflects time is deleted, and all dates are shortened to integers.
- The dates should be correct. Dates are input as hyperlinks to cells with dates or as the output of formulae like the DATE function. Issues may arise if dates are entered in text format.
- Also when computing monthly or weekly cash flows, XIRR in Excel always produces an annualized IRR.

Calculating Loan Payments

When taking out a loan, whether it's for a home, a vehicle, a school loan, or anything else, the first step is to figure out how much you'll have to pay back each month. To calculate the payment, you utilize the Excel PMT function.

Three parameters are mandatory and two are optional for the PMT function:

PMT (Project Management Techniques) (rate, nper, pv[, fv][, type])

The needed arguments are rate, which is the fixed rate of interest during the loan's tenure; nper, which is the number of payments made over the loan's term; and pv, which is the loan principle. The two optional inputs are fv, the loan's future value, which is normally a balloon payment at the conclusion of the loan, and type, the payment type, which is either 0 (the default) for end-of-period payments or 1 for beginning-of-period payments.

Any outstanding principal at the conclusion of a loan is covered by a balloon payment.

The monthly payment on a 3-percentage-point, 25-year $200,000 mortgage is calculated as follows:

=PMT(0.03 / 12, 25 * 12, 200000) =PMT(0.03 / 12, 25 * 12, 200000) =PMT(0.03

The output of this calculation is –948.42, as you can see. What is the significance of the negative sign? Because a loan payment is a money that your payout, the PMT function produces a negative result.

If the interest rate is annual, divide it by 12 to obtain the monthly rate; if the period is represented in years, multiply it by 12 to get the number of months in the term, as indicated in the previous calculation.

Many loans only cover a part of the principle, with the remaining payable as a balloon payment at the conclusion of the loan. Because this payment represents the loan's future value, you provide it as the fv parameter to the PMT function. Because the loan period is supposed to pay down just the partial principle, you would believe the PV argument should be the partial principle — that is, the initial loan principal minus the balloon amount.

Nope. You pay interest on the balloon portion of the principle in a balloon loan. As a result, the PV parameter of the PMT function must be the full principal, whereas the (negative) fv argument must be the balloon component.

Calculating the Principal and Interest on a Loan Payment

It's one thing to know the overall amount of a monthly loan payment; it's another to break it down into principal and interest components. The primary component of the loan payment is the portion of the payment that goes toward paying down the initial loan amount, while the remainder is the interest you're paying to the lender.

The PPMT and IPMT functions may be used to compute loan payment principal and interest, respectively. The value of PPMT rises as the loan advances, while the value of IPMT drops, but the total of the two remains constant over time and is equivalent to the loan payment.

The six parameters are the same for both functions:

PPMT PPMT PPMT PPMT (rate, per, nper, pv[, fv][, type])

IPMT is an acronym for Intellectual Property Management Technology (rate, per, nper, pv[, fv][, type])

The four needed arguments are rate, which is the fixed interest rate throughout the loan duration; per, which is the number of payment periods; nper, which is the number of payments made during the loan term; and pv, which is the loan principle. The two optional inputs are fv, which is the loan's future value, and type, which is the payment type: 0 at the end of the period of 1 for the beginning of the period.

The principle and interest components of the first monthly payment on a — percent, 25-year $200,000 mortgage, for example, are calculated using the following two formulas:

Cumulative Loan Principal and Interest Calculation

Use the CUMPRINC or CUMIPMT functions to compute how much principal or interest has accrued between two periods of a loan.

The same six parameters are required by both functions:

CUMPRINC(rate, nper, pv, start period, end period, type]) CUMPRINC(rate, nper, pv, start period, end period, type])

CUMIPMT(rate, per, PV, start period, end period, type]) CUMIPMT(rate, nper, PV, start period, end period, type]) CUMIPMT(rate,

Here, rate denotes the fixed rate of interest throughout the loan's period; nper is the number of payments made during the loan's tenure, and pv denotes the loan principle. The initial period to include in the computation is the start period, and the latest period to include in the calculation is the end period. where type is the payment type: 0 at the end of the period of 1 for the start of the period.

Set start period to 1 and end period to 12 to calculate the cumulative principal or interest in the first year of a loan, **for example:**

CUMPRINC(0.03 / 12, 25 * 12, 200000, 1, 12, 0) CUMPRINC(0.03 / 12, 25 * 12, 200000, 1, 12, 0) CUMPRINC(0.03

CUMIPMT(0.03 / 12, 25 * 12, 200000, 1, 12, 0) CUMIPMT(0.03 / 12, 25 * 12, 200000, 1, 12, 0) CUMIPMT(0.03

You'd set the start period to 13 and the end period to 24, and so on, for the second year.

Identifying the Minimum Interest Rate

You may use the Excel RATE Function to compute what interest rate will meet these conditions if you know how much you want to borrow, how long you want to borrow for, and what payments you can afford. For example, if current interest rates are greater than the figure you compute, you may use this computation to postpone borrowing money.

The following parameters are sent to the RATE function:

RATING (nper, pmt, pv[, fv][, type][, guess])

The three needed arguments are nper, which represents the number of payments made during the loan's duration; pmt, which represents the periodic payment; and pv, which represents the loan principle. RATE also accepts three optional arguments: fv, the loan's future value (the loan's end-of-term balloon payment); type, the payment type (0 for end of period, 1 for beginning of period); and guess, a percentage number that Excel considers as a starting point for computing the interest rate.

If the duration is presently represented in months, divide it by 12 to get an annual interest rate. In contrast, if you have a monthly payment and want an annual interest rate, you must divide that by 12.

RATE uses an iterative approach in which Excel begins with a guess value and strives to improve each consecutive result in order to get at the correct answer. If you leave guess blank, Excel uses a default value of 10%. Excel gives a #NUM! error if it can't come up with a value after 20 attempts. If this occurs, you should try again with a guess value.

On a related point, the NPER function may be used to compute the duration of a loan if you know the principal, interest rate, and payment:

NPER is a non-profit organization dedicated to (rate, pmt, pv[, fv][, type])

The three needed inputs for the NPER function are rate, which is the fixed rate of interest; pmt, which is the loan payment; and pv, which is the loan principal. The two optional inputs are fv, which is the loan's future value, and type, which is the payment method (0 or 1).

Determining the Internal Rate of Return

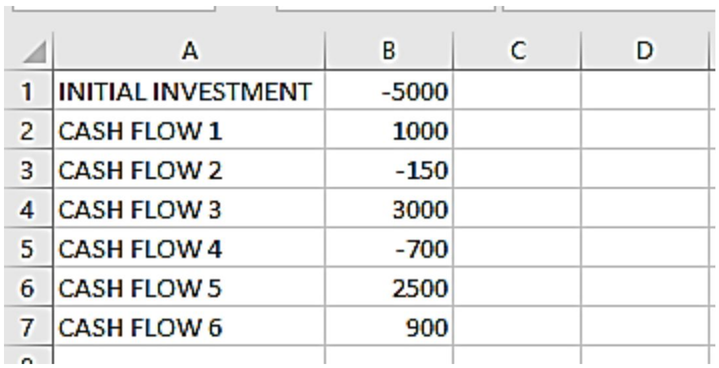
Internal Rate of Return (IRR) is an abbreviation for Internal Rate Of Return. The concept NPV, or Net Present Value, is used to describe it. This IRR is defined as the depreciation rate that brings the net present value (NPV) among all working capital (both positive and negative) out of a business or operation to 0.

It's a crucial financial instrument for determining the viability of a new project or venture. A greater IRR than that of the firm's own appropriate pace suggests that the particular investment will likely pay off in the future. The lower IRR, on the other hand, implies a bad return on investment.

The formula for the internal rate of return is IRR (value1, value2...). Value one means the initial payment. Now, let’s solve some problems. Below is a table that consists of different cash flows for many periods that differ. The main investment for this business was $5000. This means that the cash flow from day 0 is -5000. Because of this, it is seen as negative cash flow. With the data in this table, we will compute the Internal Rate of Return.

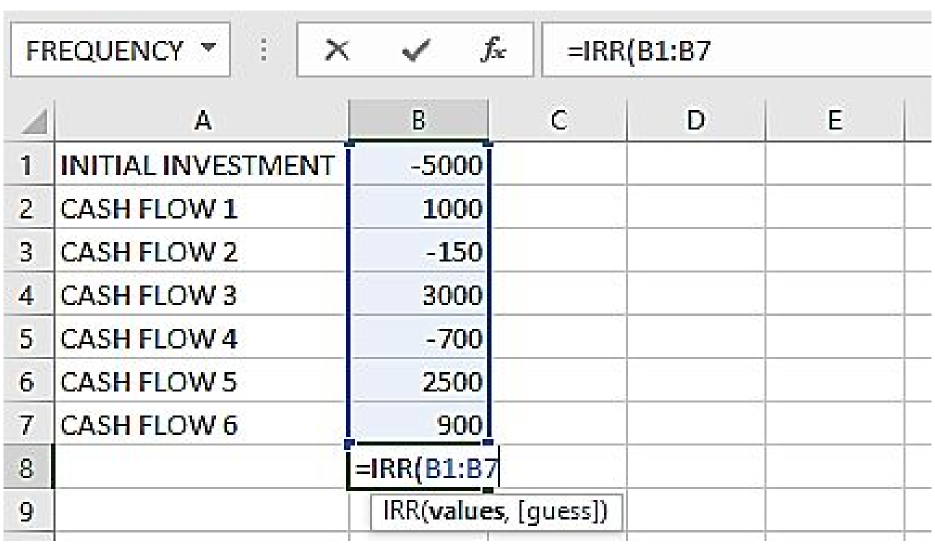
	Cash Flows
Period 0 (Initial Investment)	-5000
Period 1	1000
Period 2	-150
Period 3	3000
Period 4	-700
Period 5	2500
Period 6	900

Now, input your data in your Excel worksheet.



	A	B	C	D
1	INITIAL INVESTMENT	-5000		
2	CASH FLOW 1	1000		
3	CASH FLOW 2	-150		
4	CASH FLOW 3	3000		
5	CASH FLOW 4	-700		
6	CASH FLOW 5	2500		
7	CASH FLOW 6	900		

Now, put in this formula =IRR(B1:B7). Press **Enter**.



	A	B	C	D	E
1	INITIAL INVESTMENT	-5000			
2	CASH FLOW 1	1000			
3	CASH FLOW 2	-150			
4	CASH FLOW 3	3000			
5	CASH FLOW 4	-700			
6	CASH FLOW 5	2500			
7	CASH FLOW 6	900			
8		=IRR(B1:B7			
9					

Here is your result.

B8 =IRR(B1:B7)

	A	B
1	INITIAL INVESTMENT	-5000
2	CASH FLOW 1	1000
3	CASH FLOW 2	-150
4	CASH FLOW 3	3000
5	CASH FLOW 4	-700
6	CASH FLOW 5	2500
7	CASH FLOW 6	900
8		8%

CHAPTER 16

HOW TO IMPROVE YOUR PIVOT TABLE GAME

You may be asking why you need to learn another tool: The PivotTable when Excel already has so many excellent data-analysis tools and functions. In a nutshell, the PivotTable is a helpful tool to have in your data-analysis arsenal. The lengthy answer is that pivot tables are worth understanding because they provide a broad list of advantages, not just one or two.

Let me provide a few examples: PivotTables are simple to create and maintain; they execute huge and sophisticated computations rapidly, and they can be updated quickly and simply to accommodate for new data. PivotTables are dynamic, so you can quickly move, filter, and add to them; and, lastly, you can apply most of the formatting choices that you do to standard Excel ranges and cells to them.

Oh, and there's one more: PivotTables are completely customizable, allowing you to create whatever report you wish. This chapter, which covers 10 approaches that will make you become a PivotTable expert, highlights customizability.

Activating and deactivating the Pivot Table Fields Task Pane

When you click within the PivotTable report, Excel shows the PivotTable Fields task pane by default, and when you click outside the PivotTable report, Excel conceals the PivotTable Fields work pane.

On the surface, there's nothing wrong with it. However, you must have at least one cell in the PivotTable report selected to use the instructions in Ribbon's PivotTable Tools contextual tab. When you pick any PivotTable cell, the PivotTable Fields task window appears, taking up valuable screen real space.

Fortunately, Excel allows you to manually toggle the PivotTable Fields task pane off and on, allowing you to present your PivotTable report with more space. When you need to add, move, or remove fields, you may return to the PivotTable Fields task pane.

Follow these procedures (all two of them!) to turn off and on the PivotTable Fields task pane:

- Inside the PivotTable, click.
- Select Analyze Show Field List from the drop-down menu.
- The Close button in the upper-right corner of the PivotTable Fields task pane may be used to quickly conceal the window.

Change the Pivot Table Fields Task Pane Layout

The PivotTable Fields task pane is split into two pieces by default: the Fields section displays the available fields for the data source and appears at the top of the pane, and the Areas section contains the PivotTable areas — Filters, Columns, Rows, and Values — and appears at the bottom. This layout may be customized to fit your working style. Here are a few options:

Stacked Fields and Areas Sections: This is the default arrangement.

Sections on Fields and Areas Side-by-Side: Positions the Fields and Areas sections on the left and right, respectively. If your source data has a significant number of fields, choose this layout.

Hides the Areas section and only shows the Fields section. By right-clicking the field name and then selecting the area where you want the field inserted, you may use this layout to add fields to the PivotTable (instead of dragging fields to the Areas section). You may make extra areas for the fields by concealing the Areas section.

Only the Areas Section (2 by 2) is shown, and the areas are arranged in two rows and two columns. If you've done adding fields to the PivotTable and want to focus on moving fields between regions and filtering the data, choose this layout.

Only Shows the Areas Section (1 by 4): Hides the Fields section and shows the areas in a single column. If you don't need the Fields section anymore, use this layout. This structure also allows each section to have a larger display, which is beneficial if some of your fields have extremely lengthy names.

To modify the layout of the PivotTable Fields task pane, take these steps:

- Within the PivotTable, click any cell.
- Select Tools from the drop-down menu.
- The gear symbol represents the Tools button.
- The PivotTable Fields task pane tools are shown in Excel.
- Select the layout you wish to use by clicking on it.
- Your option affects the appearance of the PivotTable Fields task pane in Excel.

Note that you may sort the field list while the PivotTable Fields task pane tools are open. Sort in Data Source Order is the default setting, which means Excel shows the fields in the same order as they appear in the data source. Click Order A to Z if you want to sort the fields alphabetically.

Showing the Details Behind the Data in Pivot Tables

The key benefit of utilizing pivot tables is that they make it simple to summarize massive amounts of data into a concise report for data analysis. PivotTables, in other words, show you the forest rather than the trees. However, you may need to view some of those trees on occasion. If you're looking at the outcomes of a marketing campaign, your PivotTable may show you how many earbuds were sold as a consequence of a 1 Free with 10 deal. But what if you want to know more about the numbers that make up that number? If your source data has hundreds or thousands of entries, you'll need to filter it in some manner to view just the ones you’re interested in.

Fortunately, Excel makes it easy to access the records you want by allowing you to examine the information that lies behind a given data value directly. This is referred to as "drilling down to the specifics." When you drill down into a PivotTable data value, Excel goes back to the source data, extracts the records that make up the data value, and then displays the records in a new worksheet. This extraction takes just a second or two for a PivotTable based on a range or table, depending on how many entries the original data includes.

Use one of the following ways to dig down into the information underlying a PivotTable data point:

- Click Show Information after right-clicking the data value for which you wish to see the underlying details.
- Select the data value by double-clicking it.

When you try to dig down to the underlying details of a data value, Excel may give you an error message. This section of a PivotTable report cannot be changed. This error indicates that the functionality that allows you to dig down has been disabled. To reactivate this function, choose any cell in the PivotTable and then select Analyze PivotTable Options from the PivotTable Options dialog box. Select the Enable Show Details check box on the Data tab, then click OK.

When you share the workbook containing the PivotTable and you don't want other users diving down and cluttering the workbook with detailed worksheets, the issue is the inverse. In this instance, go to Analyze PivotTable Options, choose the Data tab, uncheck Enable Show Details, and click OK.

You may wish to access all of a PivotTable's underlying source data at times. If the source data is a range or table on another worksheet, showing that worksheet will reveal the underlying data. However, if the source data isn't easily accessible, Excel provides a rapid method to see all of the underlying data. Show Details by right-clicking the Grand Total column in the PivotTable (that is, the cell in the bottom-right corner of the PivotTable). (Alternatively, you may double-click that cell.) Excel creates a new worksheet with all of the PivotTable's underlying data.

Use the Pivot Table Style

One of the advantages of a PivotTable is that it is contained within a regular Excel worksheet, allowing you to apply formatting options such as alignments and fonts to specific areas of the table. This works nicely, especially if you have certain formatting needs. You may, for example, have in-house style requirements that must be followed. Unfortunately, the formatting might take a long time, especially if you're using many distinct formatting choices. And if you need to apply multiple formatting choices to different portions of the PivotTable, the overall formatting time might add up quickly. If you use a style instead of formatting your PivotTables, you may save a lot of time. A style is a set of formatting choices for distinct regions of a Pivot Table that Excel specifies, such as typefaces, borders, and background colors. For labels and grand totals, for example, a style may employ bold, white writing on a black background, and white text on dark blue background for objects and data. Manually defining all of these formats might take anything from half an hour to an hour. However, with the style feature, you can choose which one you want to use for the entire PivotTable, and Excel will automatically apply the individual formatting options.

More than 80 styles are defined in Excel, which is split into three categories: light, medium, and dark. Pivot Style Light 16, the default styling for PivotTable reports you produce, is in the Light category, as is None, which eliminates any formatting from the PivotTable.

To add a style to a PivotTable, follow these steps:

- To format a cell in the PivotTable, right-click it.
- Toggle to the Design tab.
- Click the More button in the PivotTable Styles group.
- The collection of styles displayed.
- Select the style you'd want to use.
- The style is applied by Excel.

Making Your Own Pivot Table Style

It's possible that none of the default PivotTable styles will give you the precise appearance you're looking for. In that case, you can create a custom PivotTable style from scratch to achieve that look.

When creating custom PivotTable styles in Excel, you have a lot of options. You have a total of 25 PivotTable elements to format. The entire table, the page field labels and values, the first column, the header row, the Grand Total row, and the Grand Total column are among these elements. Stripes, which are different formats applied to alternate rows or columns, may also be defined. The First Row Stripe, for example, formats row 1, 3, 5, and so on; the Second Row Stripe, on the other hand, formats rows 2, 4, 6, and so on. Stripes may help you read a lengthy or broad report more easily.

You may develop a personalized look to fit your requirements since you have control over so many components. For example, your PivotTable might need to match your company's colors. Similarly, if the PivotTable will be part of a bigger report, the PivotTable formatting may need to match the larger report's theme.

The main disadvantage of customizing a PivotTable style is that you must start from scratch since Excel does not allow you to modify an existing design. Excel, boo! Creating a custom style might be time-consuming if you need to provide formatting for all 25 PivotTable components.

However, if you're still up for it, here are the steps to follow to make your own PivotTable style:

- Toggle to the Design tab.
- Click More in the PivotTable Styles category.
- The collection of styles displayed.
- Select New PivotTable Style from the drop-down menu.
- The New PivotTable Style dialog box displays.
- Give your unique style a name
- Select the PivotTable feature you wish to format from the Table Element list.
- Then choose Format.
- A dialog box called Format Cells appears.
- To format the element's text, use the Font tab's options.
- You have the option of selecting a font, a font style (bold or italic), and a font size. You may also pick a strikethrough effect, underlining, and color.
- To format the element's border, use the Border tab's settings.
- You have the option of selecting a border style, color, and location (such as the left edge, top edge, or both).
- To format the element's background color, use the Fill tab's options.
- You have the option of either a plain color or a pattern. You can also use the Fill Effects buttons to create a gradient that alternates between colors.
- Click the OK button.
- You'll be taken back to the New PivotTable Style dialog box in Excel.

To format other table elements, repeat Steps 5 through 10.

The Preview part of the New PivotTable Style dialog box is very useful since it displays how the style will appear when applied to a PivotTable. You might want to use your new style for all of your PivotTables if you're particularly pleased with it. What's to stop you? Select the Set as Default PivotTable Style for This Document check box to tell Excel to use your new style as the default for any future PivotTables you create.

- Finally, when you're finished, click OK.

The custom PivotTable style is saved in Excel.

Surprisingly, Excel does not apply the new style to the existing PivotTable when you exit the New PivotTable Style dialog box. Dumb! Select any cell in the PivotTable, click Design, click the More button in the PivotTable Styles group to open the style gallery, and then click your style in the Custom section that now shows at the top of the gallery to apply it.

If you need to change something about your custom style, go to the style gallery, right-click it, and then Modify. Make your changes in the Modify PivotTable Style dialog box, then click OK.

If you discover that you need to develop a new custom style that is identical to an existing custom style, don't bother starting from scratch. Instead, open the style gallery, right-click an existing custom style, and then choose Duplicate from the drop-down menu. Adjust the style name and formatting in the Modify PivotTable Style dialog box, then click OK.

If you no longer need a custom style, you should remove it from the style gallery to save up space. Open the PivotTable Styles gallery by clicking the Design tab, right-clicking the custom style you no longer require, and then click Delete. Click OK when Excel asks you to confirm.

Preserve a Pivot Table

When you reload or rebuild the PivotTable, Excel has a bad tendency of not keeping your particular formatting. If you used a strong font on certain labels, for example, after a refresh, the labels may return to ordinary text. Preserve Formatting is a function in Excel that allows you to save custom formatting after a refresh; you may activate it to keep your own formatting.

In default PivotTables, the Preserve Formatting functionality is always on. This functionality might, however, have been disabled by another user. For example, you may be dealing with a PivotTable that was built by someone else and the Preserve Formatting function has been disabled.

When you refresh or rebuild a PivotTable, Excel, on the other hand, reapplies the report's existing style formatting. Excel reverts to the default PivotTable style if you don't provide one.

The steps to set up a PivotTable to retain formatting are as follows:

- You may operate with any cell in the PivotTable by clicking it.
- Select Analyze PivotTable Options.
- The Layout & Format tab is shown in the PivotTable Options dialog box.
- Uncheck the box that says "**Autofit Column Widths on Update**."
- When you deselect this option, Excel will not automatically format things like column widths when you pivot fields.
- Check the box that says "Preserve Cell Formatting on Update."
- Click the OK button.
- When you reload the PivotTable, Excel remembers your modified formatting.

Renaming a PivotTable.

Excel assigns the unimaginative name PivotTable1 to the first PivotTable you create in a workbook. PivotTable2, PivotTable3, and so on are the names of subsequent PivotTables, which are also uninteresting. However, when you create new PivotTables based on other data sources, Excel duplicates these names. If you have a lot of PivotTables in your worksheet, you can make them stand out by giving each one a distinct and descriptive name.

Here's how to do it:

- You may operate with any cell in the PivotTable by clicking it.
- Select Analyze PivotTable from the drop-down menu.
- Type a new name for the PivotTable in the PivotTable Name text box.
- A PivotTable name can be up to 255 characters long.

- Outside the text box, click.
- The PivotTable is renamed in Excel.

Disable Grand Totals

There is an additional row at the bottom of a default PivotTable with at least one-row field. The sum of the values associated with the row field items is included in this row, which is designated Grand Total. The amount in the Grand Total row, on the other hand, could not be a total. The Grand Total row, for example, comprises the average of the values associated with the row field items if the summary calculation is Average.

A PivotTable with at least one column field, on the other hand, has an additional column at the far right of the table. The sum of the values associated with the column field items is included in this column, which is also designated "Grand Total." The Grand Total row has the sums for each column item, and the Grand Total column has the sums for each row item if the PivotTable has both a row and a column field.

These grand totals are typically unnecessary for data analysis and take up space in the Pivot Table. For example, assume you want to look at your salespeople's quarterly sales to determine which quantities exceed a specific threshold for incentive reasons. The grand totals are pointless since your sole focus is the individual summary figures for each employee. **You can tell Excel not to show the grand totals in this case by following these steps:**

- You may operate with any cell in the PivotTable by clicking it.
- Select Design Grand Totals from the drop-down menu.
- For presenting the grand totals, Excel provides a range of possibilities.
- Select your preferred option.
- The menu contains four items:
- Off for Rows and Columns: This option disables the grand totals for both rows and columns.
- On for Rows and Columns: Enables grand totals in both the rows and columns.
- Turns off the grand totals for just the columns when set to On for Rows Only.

- On for Columns Only: Turns off the grand totals for just the rows.
- Excel applies the grand total option that you've chosen.

Another annoying PivotTable feature is the field headers that display in the report. The field headers include Sort & Filter buttons, but if you don't use them, the PivotTable will become cluttered. To disable the field headers, select Analyze Show Field Headers from within the PivotTable.

Workbooks with Pivot Tables Can Be Resized.

Because Excel needs to keep track of a lot of additional information to maintain the PivotTable performance acceptable, PivotTables often result in huge workbooks. Excel, for example, keeps a duplicate of the source data in a dedicated memory space called the pivot cache to guarantee that the pivoting recalculation occurs fast and efficiently.

Excel keeps the source data in the pivot cache if you create a PivotTable from data in a separate workbook or from an external data source. The time it takes Excel to refresh and update the PivotTable is considerably reduced as a result. The disadvantage is that it might increase the size of the workbook as well as the time it takes Excel to save it.

Follow these procedures to notify Excel not to store the source data in the pivot cache if your workbook has become too big or is taking too long to save:

- In the PivotTable, click any cell.
- Select Analyze PivotTable Options from the drop-down menu.
- A dialog window called PivotTable Options displays.
- Toggle to the Data tab.
- Deselect the Save Source Data with the File check box.
- Click the OK button.
- The external source data is no longer saved in the pivot cache by Excel.

Using a Pivot Table Value in a Formula

In a worksheet formula, you might need to use a PivotTable value. In most cases, the address of a cell is used to refer to it in a calculation. This won't work with PivotTables because when you pivot, filter, group, and refresh the PivotTable, the addresses of the report data change.

To guarantee precise PivotTable references, utilize Excel's GETPIVOTDATA function. The data field, PivotTable location, and one or more (row or column) field/item pairs that specify the exact value you want to use are all used in this function. Your formula reference will stay correct regardless of the PivotTable arrangement, as long as the value is shown in the report.

The GETPIVOTDATA function has the following syntax:

GETPIVOTDATA (data field, pivot table, [, field1, item1. The two required fields are the data field, which is the name of the field in the Values area of the PivotTable, and pivot table, which is the cell address of the PivotTable's upper-left corner. The remaining parameters are made up of two parts: a field name and a field item.

For example, here's a GETPIVOTDATA formula that returns the PivotTable value for Earbuds in the Product field and 1 Free with 10 in the Promotion field:

=**GETPIVOTDATA** ("Quantity", $A$3, "Product", "Earbuds", "Promotion", "1 Free with 10"). **GETPIVOTDATA** is a little difficult, so let me set your mind at rest right away by stating you'll virtually never have to peck out this function and all its parameters by hand. Instead, when you click the PivotTable value you want to use in your formula, Excel takes care of everything for you. Phew!

Conclusion

PivotTable helps a lot in Excel when working with your data. Here, the various ways you can utilize to improve your PivotTable game have been listed for you. With the steps here, you are to understand more about pivot tables.

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